THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCII. No. 2224.] LONDON, DECEMBER 26, 1905. [57TH YEAR. PRICE 6d.

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OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

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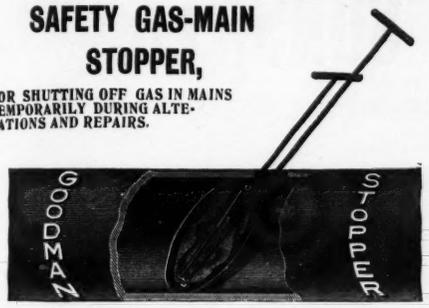
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



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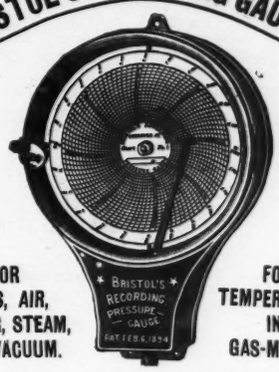

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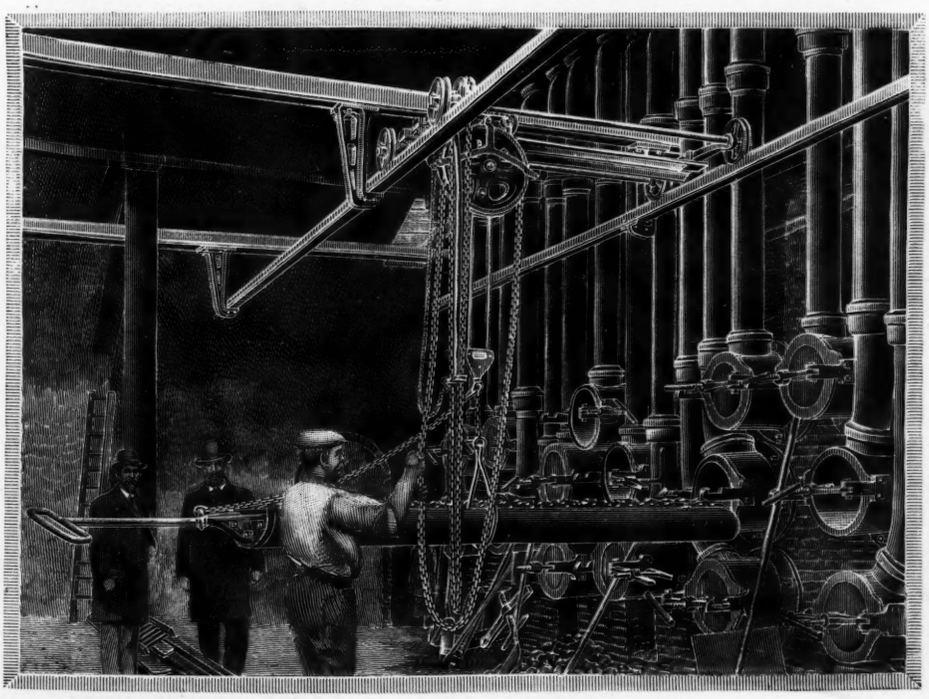

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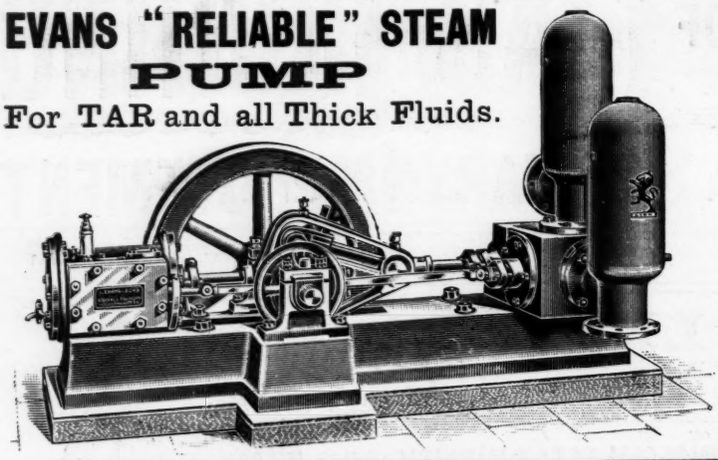

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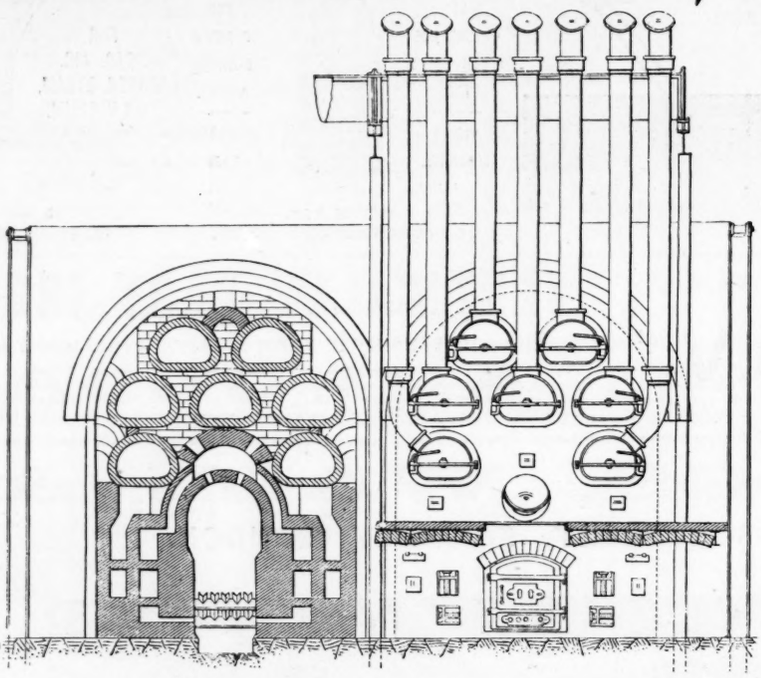

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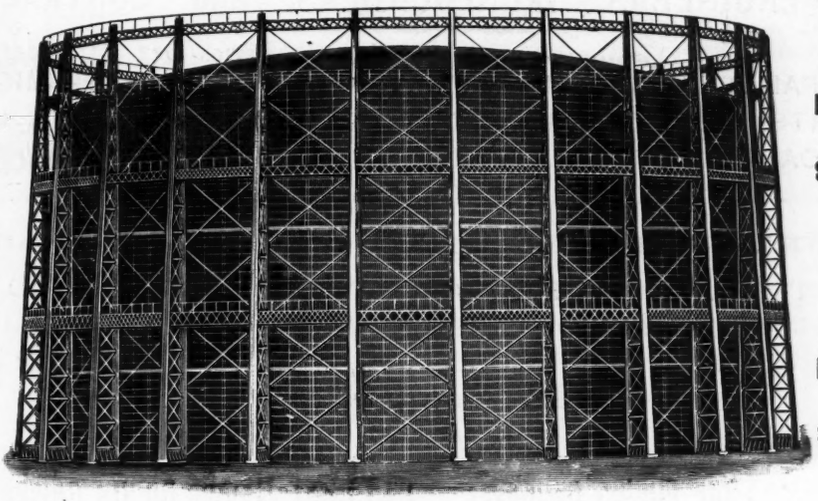

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Patent Coin Prepayment Gas-Meters

Fitted with Detachable Attachments.

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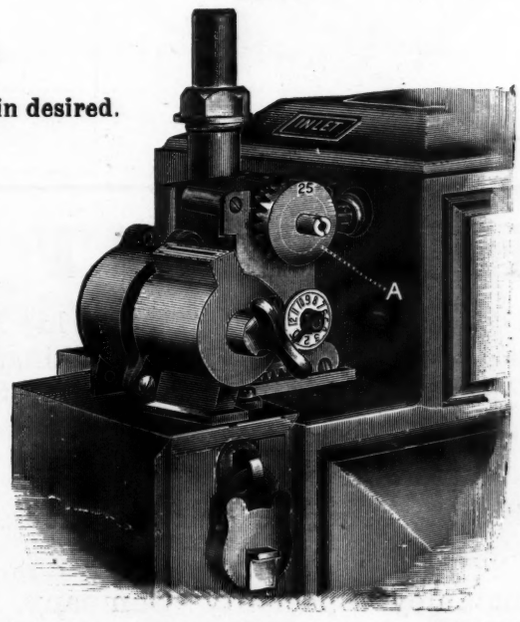

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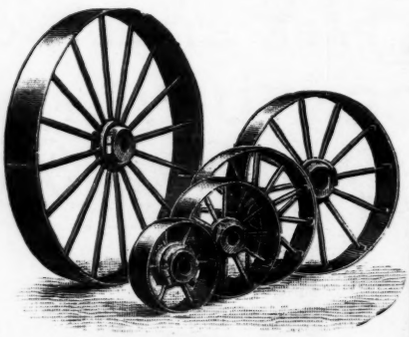

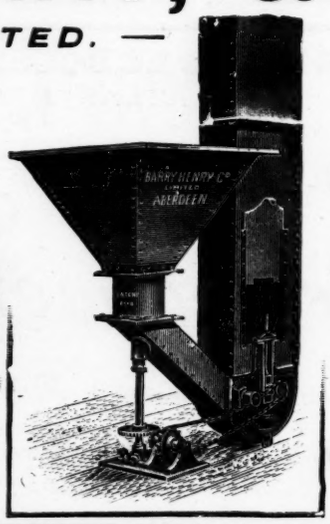

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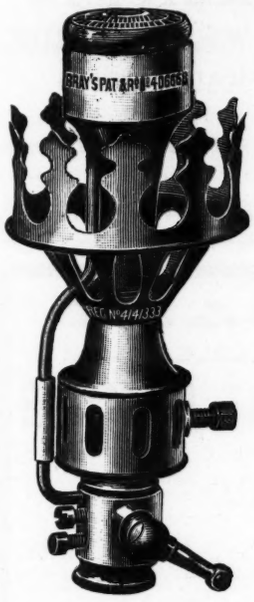
IMPORTANT NOTICE.

It is the practice of the "Gas World" to publish from time to time analyses of the accounts of Gas Undertakings in this Country. A number of such analyses appeared in the issue for September 16, and they show that at Fenton, Longton, Rotherham, and Tipton, some of the highest results were obtained in Gas Made and Coke Sold.

It may be interesting to Gas Engineers to learn that at these four places Winstanley's Settings are in use.

The Winstanley Speciality Company, Newton Chambers, Cannon Street, Birmingham.

THE "BRAY" INCANDESCENT GAS BURNER



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OUR CATALOGUE CONTAINS ALL PARTICULARS.

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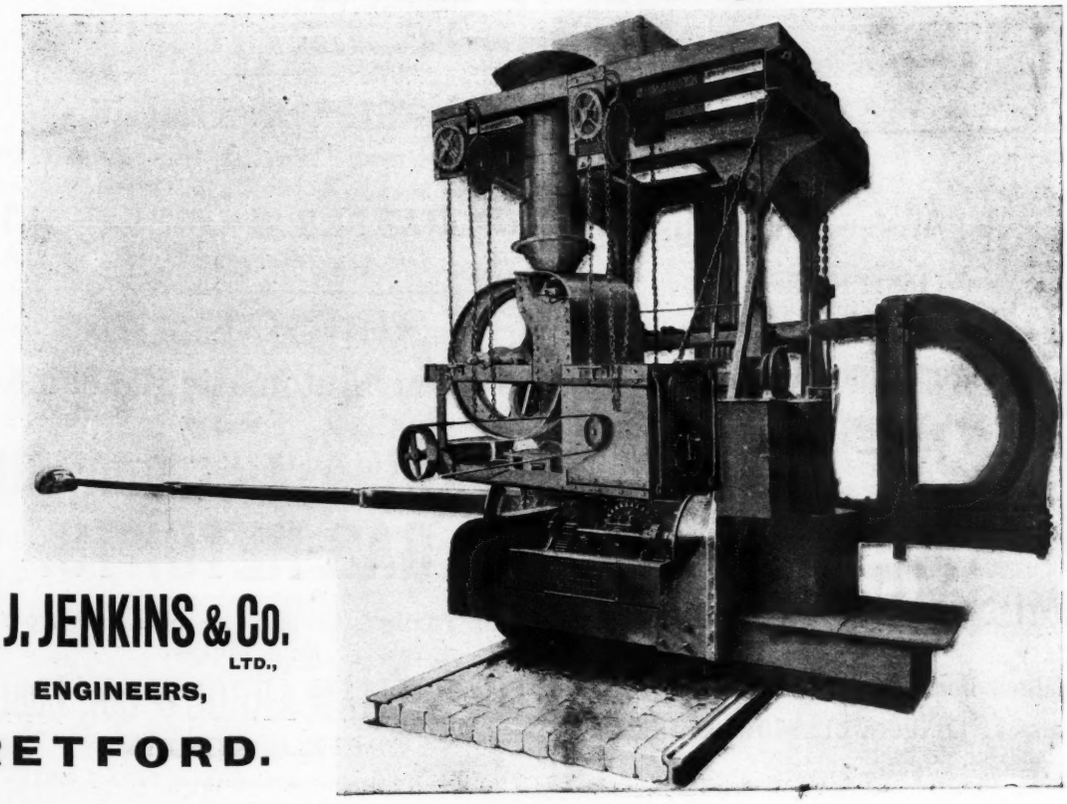
THE COMPLETE STOKER.

Both Discharging and Charging Operations performed by one machine, for Retorts 20 feet through.



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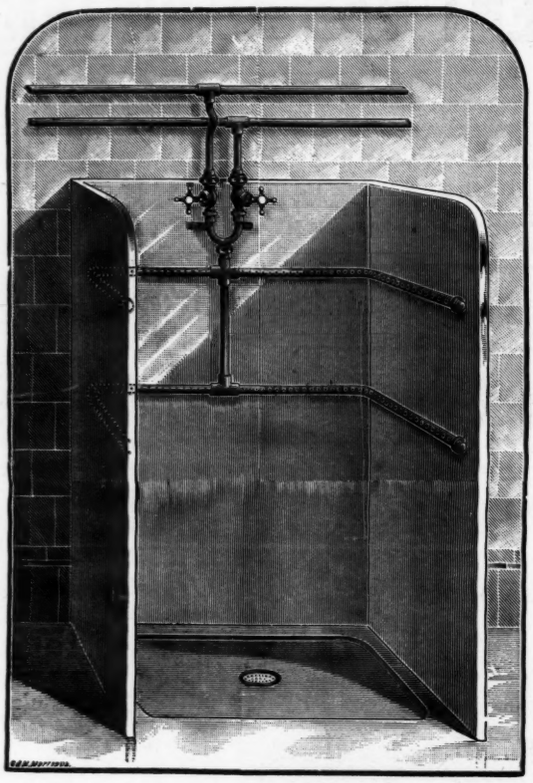
STOKERS'

Bath Fittings



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SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

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UNBREAKABLE

INCANDESCENT MANTLE

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[See Illustrated Advertisement, Dec. 5, p. 658.]

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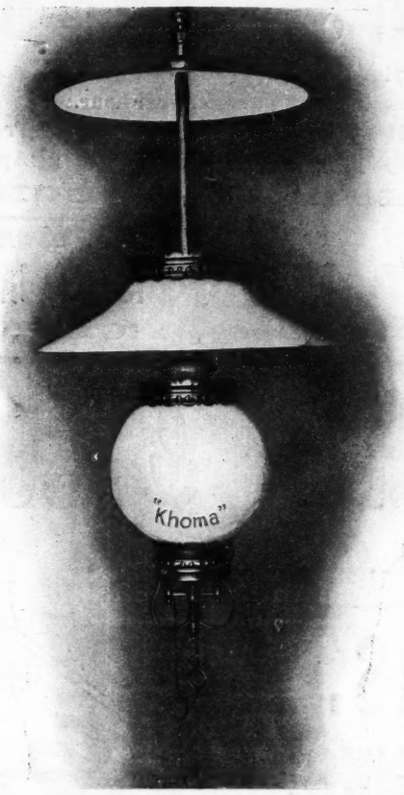
For Interior Lighting.

The only Lamp on the Market in which the Gas is properly heated and expanded before it reaches the Burner.

Imitations have not this Super-Heating Chamber for the Gas.

There are some people who have doubts as to the value of heating the gas used for incandescent lighting preliminary to combustion. The question may be simply settled, each one for himself, by comparative photometrical tests. The idea has received the support of many careful scientific investigators. Among the latest to carry their researches into this particular field are Drs. F. Haber and F. Richardt, whose valuable dissertation on "The Bunsen Flame, and Methods for the Chemical Determination of Flame Temperatures" was noticed at some length in the "JOURNAL OF GAS LIGHTING" for the 31st of January. Being towards the end of that article, it may have escaped the attention of some readers that these investigators said: "The temperature of combustion of a gaseous mixture may be raised by a preliminary warming of the gas at the expense of the combustion products (as in regenerative furnaces), but not at the expense of the burning gas itself—that is to say, by subsequent, but not simultaneous, warming."



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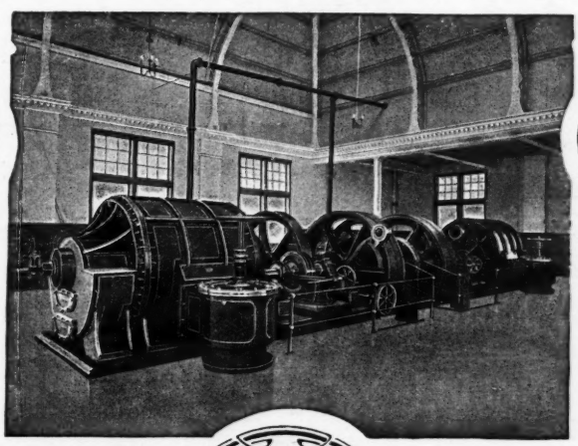

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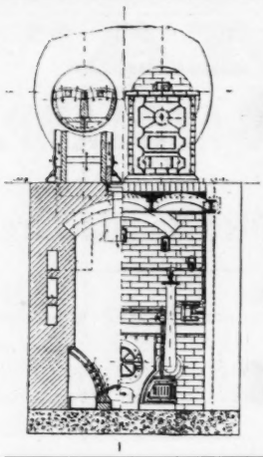

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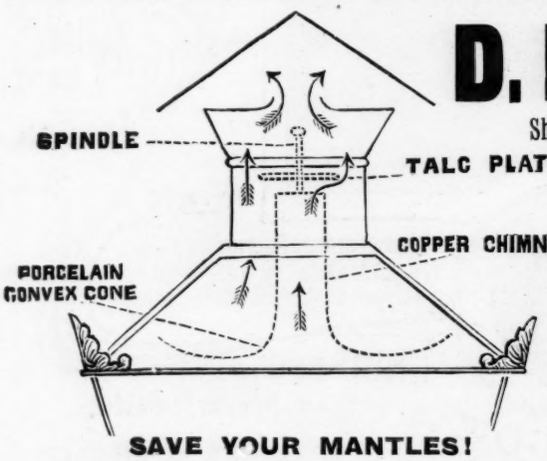

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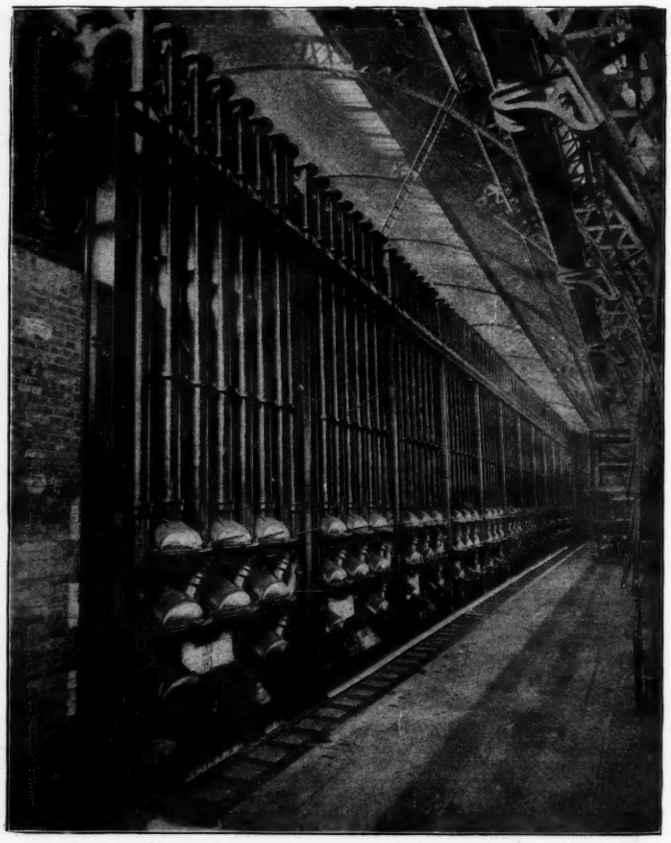

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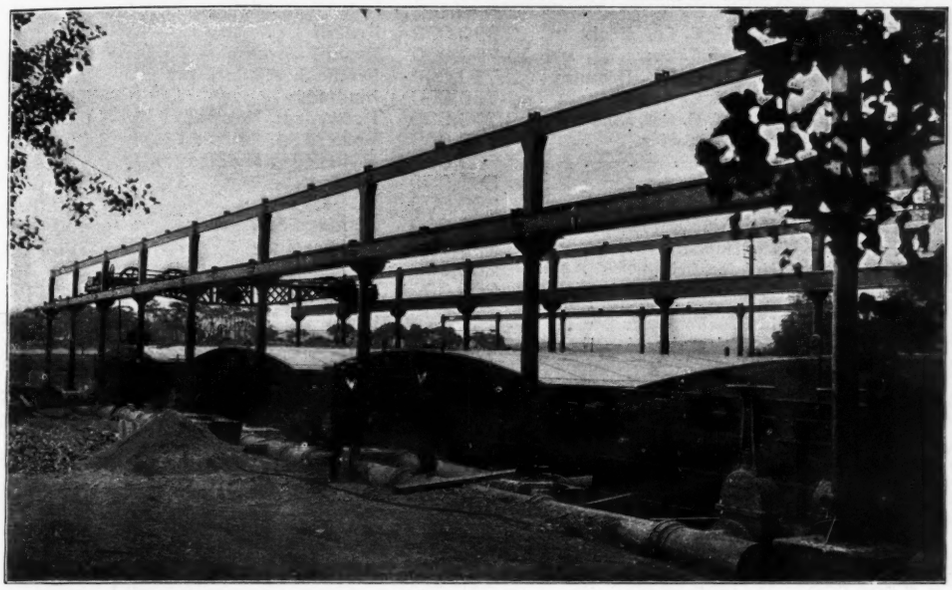

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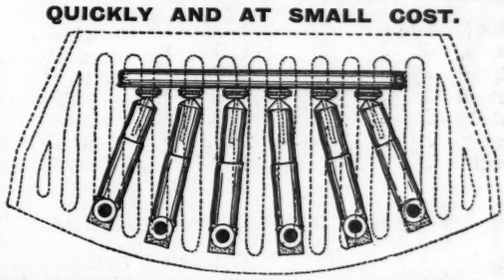

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Can be Adjusted to Shape of Grate and Gas Pressure *in situ*.

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As a Naphthalene Remover.

The Exhaust Steam heats up the Tar and the Gas, and enables it to remove the maximum amount of Naphthalene. By removing the Tar, no Naphthalene is carried forward to the Scrubbers, except in strong and thorough combination with an **EXCESS** of light hydrocarbons, so evenly distributed and always sufficient in quantity to prevent the action of ammonia on the phenols liberating the Naphthalene dissolved by them.

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DOUBLE-SUPERHEATER SYSTEM.

	Cubic Feet Daily.		Cubic Feet Daily.		Cubic Feet Daily.
Aarhus, Denmark	800,000	G. L. & C. Co., Beckton	2,250,000	Redhill	275,000
Antwerp, Belgium	1,500,000	G. L. & C. Co., „ (2nd)	10,750,000	Redhill (Second)	300,000
Aylesbury	150,000	G. L. & C. Co., Bromley	3,750,000	Reichenberg, Bohemia	200,000
Barrow	300,000	G. L. & C. Co., Fulham	1,750,000	Romford	300,000
Bath	1,000,000	G. L. & C. Co., Nine Elms	2,750,000	Rotterdam, Holland	850,000
Belfast	1,700,000	Geneva, Switz.	500,000	Rotterdam, Holland (Second)	1,500,000
Belfast (Second)	4,500,000	Gosport	200,000	Rotterdam, Holland (Third)	750,000
Birmingham	1,500,000	Göteborg, Sweden	300,000	St. Gallen, Switz.	225,000
Bordentown, N.J.	125,000	Guildford	350,000	St. Joseph, Mo.	750,000
Bournemouth	1,000,000	Hamburg, Germany	1,750,000	Santiago de Cuba	400,000
Bremen, Germany	550,000	Hartlepool	750,000	Scarborough	800,000
Bremen, Germany (Second)	950,000	Hebden Bridge	200,000	Shanghai	225,000
Brentford	1,200,000	Heidelberg, Germany	200,000	Shanghai (Second)	225,000
Bridlington	150,000	Holyoke, Mass.	600,000	Southampton	800,000
Bridlington (Second)	200,000	Hull	1,500,000	Southampton (Second)	500,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southgate	400,000
Brighton (Second)	1,850,000	Lawrence, Mass.	400,000	Southport	750,000
Brussels—Forest	1,000,000	Lea Bridge	350,000	Southport (Second)	900,000
Brussels—Ville	750,000	Lea Bridge (Second)	350,000	Stafford	500,000
Brussels—Ville (Second)	750,000	Liége, Belgium	1,000,000	Staines	600,000
Brussels—Ville (Third)	1,500,000	Lincoln	500,000	Stockport	600,000
Carlisle	600,000	Liverpool	3,500,000	Stockport (Second)	600,000
Chorley	300,000	Liverpool (Second)	4,500,000	Stockton-on-Tees	500,000
Commercial Gas Co.	850,000	Longton	600,000	Swansea	750,000
Commercial (Second)	850,000	Magdeburg, Germany	1,400,000	Swansea (Second)	1,000,000
Commercial (Third)	1,250,000	Maidenhead	225,000	Sydney—Harbour	500,000
Commercial (Fourth)	2,000,000	Maidenhead (Second)	225,000	Sydney—Harbour (Second)	500,000
Copenhagen	700,000	Malta	400,000	Sydney—Mortlake	500,000
Copenhagen (Second)	2,500,000	Manchester	3,500,000	Sydney—Mortlake (Second)	500,000
Coventry	600,000	Manchester (Second)	3,500,000	Syracuse, N.Y.	850,000
Coventry (Second)	600,000	McKeesport, Pa.	500,000	Taunton	225,000
Croydon	1,250,000	Merthyr Tydfil	300,000	The Hague, Holland	1,000,000
Croydon (Second)	625,000	Middlesbrough	1,250,000	Tilburg, Holland	400,000
Croydon (Third)	625,000	Newburgh, N.Y.	350,000	Tottenham	750,000
Deventer, Holland	150,000	Newburgh (Second)	250,000	Tottenham (Second)	750,000
Deventer, Holland (Second)	200,000	New York	1,200,000	Tottenham (Third)	350,000
Dorking	150,000	New York	4,000,000	Tottenham (Fourth)	1,000,000
Dublin	2,000,000	North Middlesex	150,000	Tunbridge Wells	1,000,000
Dublin (Second)	2,000,000	North Middlesex (Second)	200,000	Utrecht, Holland	1,000,000
Dunedin, N.Z.	150,000	Norwich	1,000,000	Utrecht, Holland (Second)	1,000,000
Durham	200,000	Ostend, Belgium	100,000	Waltham	400,000
Eastbourne	1,250,000	Perth, W.A.	125,000	Wandsworth & Putney	1,800,000
Edinburgh	2,000,000	Port Elizabeth, S.A.	400,000	Watford	300,000
Epsom	225,000	Portsmouth	1,000,000	Watford (Second)	350,000
Falmouth	150,000	Posen, Germany	450,000	West Ham	1,500,000
Faversham	200,000	Posen, Germany (Second)	700,000	Winchester	225,000
		Preston	1,400,000	Zwolle, Holland	200,000

AND WORK UNDERTAKEN DURING THIS SEASON AND LAST.

Dunedin, N.Z. (2nd)	275,000	Bridgwater	200,000	Zwolle, Holland (2nd)	200,000
Taunton (2nd)	350,000	West Ham (2nd)	800,000	Alkmaar, Holland	400,000
Bognor	100,000	Brieg, Silesia	100,000	Leiden, Holland	500,000
Bournemouth (2nd)	500,000	Brussels—Ville (4th)	350,000	Poole	1,500,000
Vienna	3,500,000	Innsbruck, Austria	200,000	Berlin-Rixdorf	650,000
Maastricht, Holland	200,000	Marlborough	100,000	Berlin-Charlottenburg	2,500,000
Antwerp, Belgium (2nd)	1,000,000	Flensburg, Sleswig	300,000	Bochum, Westphalia	530,000
Tottenham (5th)	1,000,000	Weston-super-Mare	300,000	Brussels–Anderlecht	350,000
The Hague, Holland (2nd)	500,000	Wexford, Ireland	100,000	Leigh, Lancs.	350,000
Hampton Court	500,000	Budapest, Hungary	50,000	Stockport (3rd)	400,000
Lea Bridge (3rd)	400,000	Swindon	300,000	Agram, Croatia.	200,000
Dublin (3rd)	650,000	Reading	1,000,000	Bruges, Belgium	200,000
North Middlesex (3rd)	75,000	Oberhausen, Germany	175,000	Liége, Belgium (2nd)	750,000
St. Gallen, Switz. (2nd)	225,000	Malmo, Sweden	350,000	Lemberg, Galicia	260,000
Brussels—St. Josse	1,000,000	Ipswich	750,000	Leeuwarden, Holland	400,000
Dundee	1,500,000	Winchester (2nd)	125,000	Stockholm	1,500,000

HUMPHREYS & GLASGOW TOTAL . . **164,200,000** CUBIC FEET DAILY.
UNITED GAS IMPROVEMENT CO., U.S.A. **468,400,000** CUBIC FEET DAILY.
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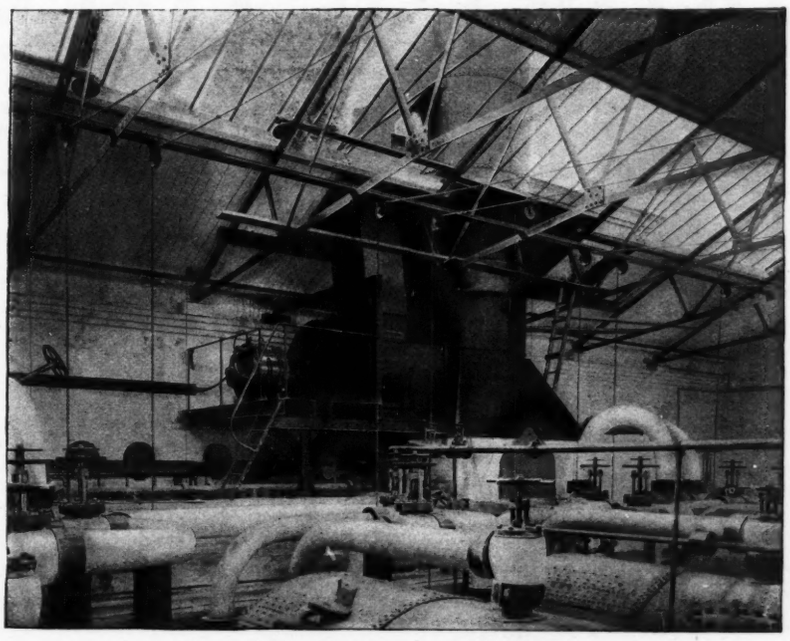

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. XCII., No. 2224.—TUESDAY, DECEMBER 26. 1905.

1905.

A Retrospect.

BUT few more days of the waning year remain; and duty now bids us glance over the months of that year, and mark the position to which passing Time has brought us in the special courses of industrial affairs within which our readers so largely move and labour. As an industry, with vast material interests rooted throughout the land, we naturally feel the rise and fall of the national and imperial tides and the calms and storms of the national and the universal life. Looking back into the near past, and observing its many happenings, there crosses in grim boldness before our mental vision the war in the Far East that caused humanity to shudder and civilization to cry for Peace. In its wake come the shocking massacres and paralyzing disorders in Russia —in which life, liberty, and trade are the sacrifices—produced by the agitation for improved social conditions and political reform. Intermingled with these terrible chapters in the year's history were the rumours of war and possible disturbance of friendly intercourse between other nations. But as we write to-day, it is a satisfaction to be able to say that of all these things only one survives; and that from it may issue—the prospect gives the hope—some amelioration of the conditions of a people down-trodden and oppressed by an autocratic system of government. For these improvements upon what has been in the outer world, we are all profoundly thankful; and still more so must we be to know that our country is at this present time at peace with all nations. Politically, we are at the moment marking-time. Recent weeks have seen a change in the Government, and the return to power of the Liberal party, after an exclusion from the sweets of office for about ten years. Mr. Balfour has been replaced by Sir Henry Campbell-Bannerman; and a Government to-day exists that is more democratic in its constitution than any that has preceded it. Whether this Government will be continued in office, no one knows. We are merely, as we have said, politically marking-time. Christmas has stood between the coming of the Liberal party into power and a General Election, which was bound to follow immediately, or almost immediately, upon the change in the nation's Executive. The appeal to the country will be the event of the New Year; and, whichever party is returned to power, the hope will be for a continuation of the peace that we at present enjoy. For in Peace we have the greatest of all British interests.

"Peace hath her victories no less renowned than War;" and in order to win enduring honour and glory, we need not go far from home. Here, among other unsolved problems, is that of the unemployed, some thousands of whom paraded the streets of London a few weeks ago. Has not the wail of their women been heard in Downing Street? What is the solution of this problem? He who can find one will earn a crown as enduring as any gained in the stricken field! There is no more pitiable or deserving object than one who is both able and willing to work, but is denied the opportunity. For such cases there is, as everybody knows, charity in abundance—as witness the generous response to the appeal for contributions to the Queen's Fund. But charity is but an alleviation, and not a permanent remedy. Work is wanted; work for all who can and will labour. What are the causes which led to an increase of unemployment in the face of a decided improvement in many branches of trade, and how is the recent diminution of unemployment to be accounted for? Again, what is the history of those who compose the ranks of the unemployed? These are questions which may well engage the attention of all interested in Social progress.

Labour supplies the greatest of all questions in the domestic polemics of the hour; and therefore we may be pardoned for pursuing this topic a little further. Formerly emigration was the means of relieving this country of what was called its surplus population. But now little is heard of it; South Africa, even, as a land of promise, having gone completely out of favour. Emigration is, in act, discouraged not only by the Labour Party in Australia, but also, apparently, by that of this country. This, as regards our distant Colony, which resulted during the year in the failure of General Booth's scheme for settling 5000 families on the land there, is clearly traceable to the cry of "Australia for the Australians," than which perhaps no community was ever committed to a more short-sighted policy, since in a new country labour is wealth. But that emigration should be looked upon with disfavour in this country is a significant and discouraging sign. Aptitude for colonizing has hitherto been regarded as one of the valuable characteristics of the Anglo-Saxon race, and that there should now be any reluctance to face the discomforts of a colonial life in search of ultimate prosperity, seems to indicate a sad weakening of the national fibre.

> Ill fares the land, to hastening ills a prey,
> Where wealth accumulates, and men decay.

It is to be hoped that this utterance of the poet will not prove too prophetic.

Be this as it may, however, the natural aspirations of mankind for a higher standard of material comfort are not to be denied; and nowhere is this fact more patent than in Russia at the present time. Also on the Continent there have been strikes of miners in Westphalia, and of engineers and others in France; but at home the relations between employers and employed continue to be amicable. During the parliamentary session, another abortive attempt was made to amend the law relating to Trade Unions, in a manner favourable to the latter; but last Thursday Sir Henry Campbell-Bannerman gave his promise to introduce a Bill, without any unnecessary delay, on lines suggested by the Parliamentary Committee of the Trades Union Congress. As regards the gas industry, it is gratifying to note the continued success of the Co-partnership system as developed by the South Metropolitan and other Companies; and it is particularly gratifying to know that the very large majority of the participators in co-partnership regard their bonuses as they ought to be regarded—namely, as a provision for old age, and to be drawn upon only in cases of absolute necessity.

Respecting general legislation, but little has been accomplished; the energy of Parliament having been paralyzed by the division of the large Governmental majority into two—or perhaps, to speak more correctly, three—parties on the Fiscal Question. This little is, however, particularly noteworthy, inasmuch as it indicates two essentially new departures. For the first time in the history of this country, immigration has been put under restraint, with the object of excluding undesirable aliens. For the first time, also, the State recognizes by legislation a duty to the unemployed—the Act passed last session providing the machinery for dispensing aid, and for funds obtained by voluntary subscription being supplemented from the rates. That we are on the eve of a momentous change, there can be little doubt.

In the financial world, no great improvement has taken place during the year. Consols, after having moved upwards in the spring, have again declined in value almost to the level of last year's prices—a circumstance which is attributable partly to dearer money, owing to the requirements of increasing trade, and partly to the increase of the nation's indebtedness. That so little has been done to check this, in a time of profound peace, is a reproach to our finances, and forms a striking contrast to the reductions which, only a few years ago, were made almost annually, out of a much smaller revenue than is now raised. This has more or less affected the value of all gilt-edged securities; but gas shares and stocks have throughout the year continued their upward tendency, and mostly leave off—to use a Stock Exchange phrase—"at their best." As usual, considerable blocks of new capital have been placed on the market, largely through

the medium of the periodical sales conducted by Mr. Alfred Richards. As the prices realized have from time to time been recorded in our columns, those interested in the financial side of the gas business will have noted not only the facility with which capital has been disposed of, but also the manifest improvement in prices—a matter for congratulation to holders of gas stocks, and also of considerable moment to the gas engineer, who has to strain every nerve to keep capital charges at the lowest possible point, and who is therefore anxious to see new capital raised as cheaply as possible. Increasing rates continue to be complained of, although no one has yet been able to devise a remedy. For any inequalities that may exist in regard to gas undertakings, the forthcoming quinquennial re-assessment will afford an opportunity for redress; but it may be remarked that one source of alleviation from over-rating may be found in a low capital account, or, to speak more correctly, low capital charges. The condition of the Money Market has not afforded any encouragement to local authorities to embark in purchases of gas undertakings, or, indeed, in ventures of any kind requiring additional capital. Practically, the only exception to this general statement is the London County Council, who seem to regard themselves as above financial considerations. Not content with having established a river steamboat service which experience has already proved to be but scantily appreciated, more particularly during the winter months, they are now, contrary to the advice of their Finance Committee, applying to Parliament for powers to supply electricity over a vast area—exceeding the bounds of their jurisdiction—at an acknowledged loss for the first few years. This scheme has aroused the fears of certain of the Local Authorities owning electricity undertakings within the area prescribed by the Bill; and if opposition to it be anything like so pronounced as was the opposition to the Administrative County of London Electricity Bill last session, an enormous waste of public money must ensue. We are hoping, however, that before further Electricity Bills are passed for the Metropolis, there will be a Royal Commission appointed to consider the whole question.

The year has again been a prosperous one for the gas industry, although for the first half of it the increase in consumption was not very marked; the Gaslight and Coke Company, for example, experiencing a falling off, and having, moreover, to dip heavily into reserves for the maintenance of the ordinary rate of dividend. On the other hand, the South Metropolitan Gas Company showed an improvement in this respect, which is all the more gratifying having regard to the low price of 2s. per 1000 cubic feet which the Company are now charging. The Wandsworth and Putney are the first Gas Company within the area of Greater London to follow the example of the South Metropolitan Company in this matter of price—they having recently announced a reduction to 2s. per 1000 cubic feet, accompanied by a discount of 10 per cent. for gas-engine consumption. With the other Suburban Companies, a further reduction of price can only be a matter of time, since they are all in a flourishing condition. An apparently retrograde step was taken by the South Suburban Company in adding one penny to their price, owing to their having been obliged to withdraw from Parliament their proposals for a reduction of illuminating power. This increase has, however, only restored the price to what it was before the issue of their famous circular-letter to their consumers last year, by which a reduction of 1d. per 1000 cubic feet was announced to accompany a reduction of illuminating power. In the Provinces, alterations of price in favour of the consumers have been pretty general; but perhaps the most notable feature in this connection has been the "cut" prices conceded to users of gas for power purposes, which have been forced upon some gas undertakings by the threatened competition of the "suction" gas-producer. The fact that illuminating gas of the usual quality can be supplied with advantage by the undertakings at so low a figure as 1s. 6d. per 1000 cubic feet, or even less, is an unmistakable sign of strength.

Of great importance to the industry, having regard to the competition to which they are now subjected, is the action of the Legislature in relieving the Metropolitan Companies of the restrictions under which they have laboured so long, as to presence of sulphur compounds other than sulphuretted hydrogen. This, by the irony of fate, it fell to the lot of the London County Council to accomplish by means of the London Gas Bill, which they had promoted for the purpose of carrying into effect the recommendations of the Departmental Committee of the Board of Trade. The precedent thus set has been speedily followed by the joint application, under the auspices of the Gas Companies' Protection Association, of fourteen Suburban and Provincial Companies for similar relief; in addition to which some separate applications will engage the attention of Parliament next session. In regard to the joint promotion, an attempt is being made to organize a combined opposition; but those who are initiating this cannot be aware of the circumstances under which the sulphur clauses have been abrogated in the cases of the three London Companies and the South Suburban Company.

Public lighting has been a subject of prolific controversy during the year; and it is satisfactory to record the growing appreciation of incandescent gas for street purposes, as evidenced by its adoption for the new thoroughfares of Aldwych and Kingsway, which were opened in October by the King in person. The example, also, of the City of London, in substituting it for electric lighting in various main thoroughfares, seems likely to be followed largely by all local authorities not biassed in favour of electricity by having embarked in its supply.

Respecting the markets in which the gas industry buys, gas coal has continued to be plentiful, and prices have been lower than for some years past, particularly in the Midlands, where, during the summer, competition was exceedingly keen. Nor did the market harden appreciably with the advent of the winter season, although trade in the iron and steel districts has taken a very favourable turn during the last few months. Coke has followed coal to some extent, having, throughout the year, been low in value. But tar and sulphate of ammonia have shown practically no change; the latter, however, being at the moment a drooping market. Prices of material have for some time been against buyers, and for the present the opportunity for purchasing gas plant at low rates has disappeared. Gas oil has for some months been an uncertain market, chiefly owing to the riots at Baku, which for a time jeopardized deliveries from Russia.

Reference has been made above to the action of the London County Council in promoting a Bill for the further regulation of gas-testing in the Metropolis, the decision of Parliament with regard to which made memorable an otherwise exceptionally dull session so far as gas legislation is concerned. This Bill, which eventually became law as the "London Gas Act, 1905," was considered by the Committee of the House of Commons in preference to that which had been promoted by the three Metropolitan Gas Companies for the same object. In addition to the abolition of the sulphur restrictions, it provides for the discontinuance of Police Court proceedings for the recovery of forfeitures from the companies for default in illuminating power or purity, and the substitution of the Chief Gas Examiner as the Assessor of such forfeitures. There are other minor improvements in procedure. But, as presented, it also prescribed, as the mode of testing for illuminating power, the 5-feet rate of consumption as recommended by the Departmental Committee of the Board of Trade, and a consequent alteration in the nominal value of the gas supplied by the South Metropolitan and Commercial Companies from 14 to 13 candles. This was strenuously opposed by the Companies; the Gaslight and Coke Company, though not directly affected, loyally co-operating to defeat the proposal. The opposition was unsuccessful in the first House; but, being renewed in the House of Lords, it resulted in a decision by the Committee, presided over by the Earl of Rosse, in favour of the retention of the then existing mode of testing—that is to say, the 16-candle illumination method—the evidence proving beyond a doubt the unsatisfactoriness of the 5-feet rate of consumption method for gas of a lower quality than 14 candles unaccompanied by any regulation of the air supply to the burner. Thereupon the London County Council threatened to withdraw the Bill; but eventually an adjournment was decided upon, and during this an agreement was arrived at. The terms of this agreement were reported in our issue of July 11 last, and may be described as an up-to-date re-enactment of the provision in the Act of 1868. It provides that the burner shall be the most suitable for obtaining, and that in making the test it shall be so used as to obtain, from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light. In order to fulfil this condition with the rate of consumption fixed at 5 cubic feet an hour, it is necessary to regulate the air supply to the requirements of luminous combustion; and

accordingly the burner submitted by the Companies to the Gas Referees, and which has received their approval, is one with an adjustable air supply devised by Mr. Charles Carpenter, the Engineer-in-Chief of the South Metropolitan Gas Company. This arrangement renders the burner equally well adapted for any quality of common gas—whether made from coal alone or a mixture of coal gas and carburetted water gas; while, it is almost unnecessary to say, the burner gives a better result than the now discarded "London" argand. Among the innovations also introduced by the London Gas Act is the examination of gas supplied in London for its calorific value, but for information only. In view of this, considerable interest attaches to the calorimeter that has been devised by Professor C. V. Boys, F.R.S., who is one of the Metropolitan Gas Referees. This instrument, which has been fully described in the "JOURNAL," will, it is anticipated, be the one that the Referees will prescribe for giving effect to the provisions referred to.

The South Suburban Gas Company were successful in their third endeavour to obtain relief from the sulphur restrictions; and they now rank with the Metropolitan Companies in this respect. Unfortunately, however, they failed to carry that portion of their Bill which provided for a reduction of illuminating power from 15 to 13 candles, owing entirely, as would appear, to their objection to the mode of testing recommended by the Departmental Committee of the Board of Trade. The Committee of the House of Commons, having just previously imposed this upon the London Companies, felt themselves bound to impose it in this case also, although evidently not unwilling to concede the asked-for reduction of illuminating power. As, however, this would have marked down the gas proposed to be supplied from 13 to 10 candles, or even less, Sir George Livesey and his colleagues decided to withdraw this part of the Bill. In doing this, Sir George rendered, as is now seen and acknowledged, an essential service to the whole of the gas industry.

In few other respects were the proceedings of the session notable. The Bill promoted by the Hitchin Gas Company for incorporation and further powers was opposed by the Hitchin District Council, with the object of obtaining the insertion of a purchase clause. This was defeated in the Commons; but the desired clause was inserted by the Committee of the Upper House. The Croydon Gas Company further extended their undertaking by absorbing that of the Caterham Company. The Shepton Mallet and Andover Companies obtained powers to supply electricity in addition to gas; the latter Company taking over from the Corporation of Andover their Provisional Order for electric lighting. Fourteen candles continues to be favoured as the standard of illuminating power, although in one or two instances 15-candle gas was prescribed in the Acts of last session, apparently under the influence of the Model Clauses. In most cases the "London" argand is prescribed as the testing-burner; the "Wandsworth" burner, however, occurring in two or three of the Acts. The peculiar position of gas affairs at Crewe, where the gas supply is in the hands of the London and North-Western Railway Company (who are under no obligations whatever, except under the provisions of the Gas-Works Clauses Act, 1847), again came before Parliament in the shape of a second attempt by the Railway Company to obtain additional powers of supply without placing themselves under the customary regulations. This attempt failed, as it deserved to do, since there can be nothing in the conditions prevailing at Crewe that could justify the handing over to the Railway Company of the gas supply, unaccompanied by the obligations which are invariably imposed upon statutory gas undertakings. The Local Authority have now given notice to the Company of their intention to apply to Parliament for powers to be constituted the gas authority, and to purchase the mains.

The legal proceedings during the past year included an unsuccessful endeavour on the part of the Omagh Urban District Council to upset the award of the Arbitrator appointed by the Irish Board of Works to assess the amount to be paid for the undertaking of the Omagh Gas Company. The Ilford Gas Company were again unsuccessful in their defence of actions brought against them for damage done by flood water; and the Edinburgh and Leith Gas Commissioners were mulcted in damages to the extent of £3750 by the Edinburgh Court of Session for polluting a well belonging to Messrs. James Muir and Sons, brewers. A friendly suit between the Poplar Borough Council and the Commercial Gas Company was heard at the Thames Police Court, when it was decided that the defendant Company were under obligation to reinstate roads after the laying of gas-mains in such a manner as to prevent risk of subsidence. The Metropolitan Gas Company of Melbourne were successful at the hearing by the Privy Council of the appeal by the Melbourne and Metropolitan Board of Works from a judgment of the Supreme Court of Victoria, delivered on Aug. 12, 1903, reversing a decision given in the previous April by Mr. Justice Williams. This case is of importance, since it involves a question of differential rating; the final decision being that, under the condition of rating in Melbourne, the mains of the Gas Company must be classified as "unsewered property," and are not liable to be rated for the cost of sewering. The Ashton Gas Company pursued to the bitter end their contention as to the legality of payment of income-tax on maximum dividends; but the decision given against them by the House of Lords sets the matter finally at rest. Overshadowing all other legal proceedings, both in interest and importance, was the case of *Graham, Morton, and Co. v. Compagnie l'Union des Gaz*. This was an action brought by the plaintiffs for the recovery of retention-money due on certain contracts entered into by them with the defendant Company for the erection of inclined-retort settings at the Milan Gas-Works. The contracts were duly fulfilled, apparently to the satisfaction of the Gas Company and their officials at Milan; but the settings were subsequently altered by them, and then pulled out and replaced by others of a different construction without communication with the plaintiffs, on whom a claim was made for damages resulting from alleged faulty construction. This claim was, in the action, successfully resisted; the judgment delivered by Mr. Justice Grantham being a complete vindication of the plaintiffs' reputation. There is, however, no need to recall the details of this somewhat painful case, out of which, to the general satisfaction, Messrs. Graham, Morton, and Co. emerged triumphantly.

Early in May, the Home Secretary made a certificate, in pursuance of section 79 of the Factory Act, 1901, certifying as dangerous the use of locomotives, waggons, and other rolling stock on private lines or sidings used in factories or workshops, or in any place not being part of a railway within the meaning of the Railways (Prevention of Accidents) Act, 1900. This action was followed by the issue of draft regulations, to which much objection was made. Thereupon the Home Secretary announced that an inquiry would be held in the month of November, indicating at the same time in general terms a number of modifications which he would be prepared to make in order to meet many of the objections that had been raised. The inquiry was opened at Caxton Hall, Westminster, on the 22nd of November, when upwards of 200 undertakings engaged in varied industry put in appearances by Counsel, either individually or collectively. As was to be expected, the gas undertakings throughout the country were well represented, and explanations were elicited by the several Counsel representing them as to the meaning of the regulations that did much to allay apprehension with regard to them. Subsequently, a revised draft of the proposed regulations was issued; and this, with some verbal alteration, was accepted by the representatives of the gas industry as satisfactory.

Turning to associated technical work, the annual meeting of the Institution of Gas Engineers, under the presidency of Mr. D. Irving, of Bristol, was most successful in every respect. The subject-matter of the various papers left but little to be desired; and the discussions were full, and much to the point. The Council, moreover, were able to place before the members a year's record of highly important and useful work. Mention is deservedly made first of their action with regard to the threatened adoption by Parliament of the 5-feet per hour rate of consumption method of testing, without regulation of the air supply, as recommended by the Departmental Committee of the Board of Trade; for this constituted an entirely new departure. Rightly conceiving that, in the interests of the gas industry, this retrograde proposal should be resisted by every available means, the Council drew up a Memorial to the Board of Trade, formulating their objections to it, and submitting, as an alternative, a method of testing which they fully believed would secure uniformity of testing, and be generally accepted. Their request for an interview with the Board of Trade in support of the Memorial was not acceded

to, mainly on the ground that the decision on the question rested with Parliament. They subsequently memorialized the House of Lords on the subject; and Mr. Irving was one of the witnesses called on behalf of the Companies at the hearing of the London Gas Bill before a Committee of that House. The action of the Council of the Institution was challenged on the reading of the report at the annual meeting, but, after a full discussion, was upheld by an overwhelming majority—only three voting in favour of a hostile amendment, and two against the adoption of the report. In this connection may be mentioned the action of the Council later in the year in appearing by Counsel at the Home Office Inquiry on the proposed regulations as to locomotives and waggons on private lines and sidings, to watch the proceedings on behalf of the gas industry. Another very important matter which the Council were able to announce at the annual meeting as having been brought to a successful conclusion is the affiliation of the District Associations, six of which are now united to the Institution and directly represented on the Council. The only considerable body of gas managers now standing aloof from this very desirable combination is the North British Association of Gas Managers, which in this matter has characteristically displayed a quite untameable independence. The award of the Birmingham Medal to Mr. James W. Helps, in recognition of his devoted work for the gas industry, met with cordial and universal approval. The year also saw the birth of another District Association, in the form of the Wales and Monmouthshire Institution of Gas Engineers; and of another Junior Association—the Midland Junior Gas Association—both of which have made an excellent commencement. From the Antipodes comes news of the formation of the Victorian Gas Association, having its head-quarters at Melbourne. In France, Germany, America, and elsewhere, as our pages have borne witness, Gas Association work continues with vigour, to the advantage of the solution of technical and commercial problems.

In the domain of gas engineering, there are no great developments to record. The completion of new works at Hastings from the designs and under the superintendence of Mr. C. E. Botley, assisted by his son, Mr. C. F. Botley, was celebrated by a visit of the Institution of Gas Engineers on the occasion of their annual gathering in June, and well-deserved encomiums were passed upon what was seen by the large assembly of competent judges. Large new works have been erected at Hilsea, for the Portsea Island Gaslight Company, by Mr. J. D. Ashworth, the Company's Engineer and Manager. The completion of a large gasholder at the Neepsend works of the Sheffield United Gas Company, designed by Mr. J. W. Morrison, the Company's Chief Engineer, and of another at the Mariendorf (Berlin) works of the Imperial Continental Gas Association are among the prominent events of the year, to which may be added the construction of a large gasholder and tank on the Intze principle at Amsterdam. Mention should also be made of the reconstruction of the works at Norwich by Mr. Thomas Glover on somewhat original lines; the coal-storage, carbonizing, condensing, and scrubbing plant being concentrated upon one site, and the exhausting, purifying, and measuring and storage plant upon another—the distance between the two being about half-a-mile. Extensive reconstruction and enlargement have proceeded at the Tottenham Gas-Works, where a large new retort-house has been constructed—from the designs of Mr. A. E. Broadberry, the Company's Engineer—of rolled steel joists, filled in with light brickwork, instead of with the usual heavy brick walls. New gas-works were completed at Winchester, Peebles, and other places, during the year; and an interesting example of small gas-works construction was brought into use at the First Garden City. Reference may here be made to the falling in of part of the roof of Charing Cross Railway Station, accompanied by lamentable loss of life. Whatever may prove to have been the actual cause of the accident, the possibility of such an occurrence indicates the necessity of providing an ample margin of safety in the dimensions of all scantlings of such structures, and also of taking all precautions to secure their preservation by thorough and periodical painting.

Reference to constructional work and manufacturing appliances would not be complete without a note of the outstanding event of the year, which was the publication, after the maintenance over a long period of the closest secrecy, of the results of the work that has been done in connection with the vertical retort system as developed at the Dessau Gas-Works. From the point of view of advantage exceeding the older systems of working, the results at Dessau and at Mariendorf have so far been disappointing. Through, we fear, the want of energetic treatment on the part of those into whose hands the Settle-Padfield system fell, interest in it flagged; but it has revived somewhat by the installation of a setting at the Cleethorpes Gas-Works. The work of perfecting the Woodall-Duckham vertical retort has been vigorously proceeding at Bournemouth; and more will shortly be heard of it. Investigation work in like direction has also been carried on with more or less enthusiasm elsewhere. Apart from the vertical retort system, the most conspicuous feature has been the activity in the installation of new retort-house machinery. The adoption of oil-washing systems for the prevention of the deposition of naphthalene has been greatly encouraged by the excellence of results realized; but there has been a regrettable lack of support given to the naphthalene inquiry instituted by the Southern District Association. It is due to the Gaslight and Coke Company here to say that they have largely saved the investigation from failure by the facilities they have generously placed at the disposal of the Committee at their Silvertown works.

Munificent has been the year in its contribution to the solidity of the gas industry. The inflow of new custom, both in the ordinary and prepayment branches, has gone on without intermission; and likewise there has been no pause in the growth of the popularity of gas cookers and fires and other heating appliances both for domestic and industrial use. This, as pointed out last week, has done more towards mitigating the impurity of the atmosphere of our cities and towns than all the "missionary enterprise" of the smoke abolitionists. This is not said in any depreciatory or carping vein. We do not under-estimate the value of their work, which we hope will be as sedulously prosecuted in the future as in the past; for in that work lies benefit not only for communities but for the gas industry. Incandescent gas lighting has been asserting with greater and greater vigour and effect its economies and efficiencies; and inventors do not abate their energies in realizing advance in all directions. But except in the improvement of inverted burners, there has been no particularly notable achievement during the year. In gas-fittings generally, the marked gains in artistic merit and in usefulness of recent years have been supplemented. In gas cookers and fires, the manufacturers have been keenly alive to the importance of adding to their conveniences and extending the range of their productions to meet the varied conditions and purposes. An important event connected with the manufacture and supply of plant and appliances to the gas industry has been the formation—for co-operative purposes with other organizations in the industry, for the consideration of commercial questions affecting industry, and for the fostering of comradeship—of the Society of British Gas Industries.

Accidents on gas-works have much scarred the year. True, they have not been of an extensive character, but unfortunately in a few instances have involved loss of life—in one that, to the pain of his professional colleagues, of Mr. J. F. Bromley, the Engineer of the Batley Gas-Works. Of gas explosions, the most destructive occurred at the South Shields Gas-Works. Gas suffocations and poisonings—serious indeed being the recent ones in North London and Liverpool—occurred at intervals, and were due to neglect, carelessness, and accident.

Many changes have occurred in the professional ranks of the industry. It is the invincible lot, that the flight of time, ill-health, and other causes, should bring about a severance from duty loyally performed. But in many cases—we have some here—it is difficult to dissociate in one's mind certain men from the places they have filled. Mr. William North passes into retirement from Stourbridge; Mr. W. R. Cooper, of Banbury, has stepped from official work to a directorship; Mr. Harrison Veevers vacates his office at Dukinfield, and will act as Consulting Engineer; Mr. Henry Peaty quits his post at Burslem; Mr. W. Parlby, of Hereford, has tendered his resignation, to take effect on Sept. 30 next year; Mr. G. P. Lewis has relinquished his appointment at Aldershot; and impaired health, we regret, compels Mr. C. E. Ball, of Ilfracombe, to lay down his work. Mr. W. T. Carpenter passed from his post in the Sheppey Gas Company into retirement; but, in an all too short time, the final call came. Numerous other changes have occurred in the official ranks during the year; but there have been none of the "plums" of the

profession open for competition. It is, however, interesting to note that several assistants have risen to full responsibility by the transference of their services. Among the principal appointments of the year were those of Mr. William Newbigging to Macclesfield in succession to his late brother. Mr. James Dougall has gone to take charge of the Buenos Ayres (New) Gas Company's works; and his old position at Margate has been filled by the appointment of Mr. Frank A. Winstanley. Mr. J. S. Naylor passed from the management of one of the stations at Manchester to the vacancy created at Rotherham by Mr. Winstanley's migration to Margate. Mr. J. W. Buckley left Falmouth to succeed Mr. Sidney E. Stevenson at Devonport; Mr. Edward Jones quits Pontypridd for Burslem; Mr. Laurence Hislop has passed southwards from Paisley to Berwick and Tweedmouth; and Mr. T. Ebenezer Pye has transferred his energies to Chichester. Some of the principal instances of assistants ascending to full charge are: Mr. C. H. Webb, from Stockport to Stourbridge; Mr. R. T. Stoddard, from Halifax to the Holyhead and North Wales Company; Mr. L. V. Whitaker, from Wakefield to Pontefract; and Mr. H. H. Hoare, from Taunton to Falmouth. To Mr. John Power, Assistant at Derby, has been confided the superintendentship at the Neepsend works of the Sheffield Gas Company; while Mr. H. Gage-Edwards has left St. Albans for Colombo. This list does not exhaust the changes in status; but they are sufficient to encourage those who are at present occupying positions subordinate to the engineer in gas-works.

The shadow of death has hung somewhat heavily over the gas industry; and several have passed from the activities of life into the, to us mortals, great impenetrable beyond. While we all mourn their loss, we bow in great humility to the Higher Will. We have mentioned the deplorable circumstances that claimed Mr. J. F. Bromley a victim; and the removal early after retirement of Mr. W. T. Carpenter. Two men who had served their full course in the industry with the scrupulous faithfulness that emanates from innate conscientiousness, passed from our midst in the persons of Mr. Andrew Dougall and Mr. Edward Baker. The memory of such men is imperishable while those survive who knew them, and knew of their worth and work. Mr. Alexander Smith, of Aberdeen, Mr. Robert Ashton, of Barnstaple, Mr. Arthur Mead, Mr. John Davis, of Nantwich, and Mr. George Tooley, of Leeds, are among others who have left the ranks in which they were honest workers. Names that are indelibly written in the pages of the history of the gas industry are those of Mr. George Bray and Professor Charles R. C. Tichborne. They are no more; but their completed work memorizes the generous application of their gifts to the advancement of the interests of the gas industry.

It is hard to turn at once from these losses—to remove from immediate thought those whom one met, greeted, and fraternized with periodically—and regard with gratitude the position of the industry as a whole. Yet a review of the whole of what we have written cannot but stimulate the utmost gratification that the material interests of the industry have been furthered in the chapter that is closed. And as to the future? There stands in the path great competition; but we can go forward with the utmost confidence, supported by the knowledge of our strength. With confidence and strength, with the bonding of effort and the broadening and deepening of sympathies, with the energy that is being displayed (and which it has been a pleasure to encourage) in the second rank of the profession in preparation for the front, and with favourable conditions of markets, continued prosperity, so far as human eye can see, is assured. The prosperity of the gas industry means, or should mean, the personal advantage of all concerned in it. Therefore we close with the fervent hope that the coming year may hold for all the workers in, and supporters of, the industry

An Abundance of Prosperity and Happiness.

Disposal of Spent Ammonia Liquor.

Last week we commented upon some of the material aspects of the determination of the Sutton District Council to substitute a number of incandescent gas-lamps by electric lamps; and we showed—we believe conclusively—that the change was not the result of any solid or other advantage that the ratepayers are to receive, and that, if the facts before us were the only grounds for the decision of the Council, they were seriously deluding themselves as to the prospective value of the proposed scheme. In further considering the subject, it occurs to us that antagonism towards the Gas Company may have originated in the difficulty that arose between them and the Council some time ago through the temporary passing of effluent from the gas-works, which, we have not the slightest doubt, did for a brief space do mischief to, and prevented the proper working of, the bacteria beds in the treatment of the town's sewage. The disposal of spent ammonia liquor is, in view of such trouble as this and the pollution of streams, a source of much anxiety to gas engineers; and, in the Metropolitan area, the Water Board's opposition to its discharge into water-courses has created much difficulty in the working of sulphate plants. However, as the result of the action of the Local Authority, the Sutton Gas Company had to cease working their plant, and thereby incurred loss. Since then they have adopted a new process (invented and patented by Mr. John Radcliffe, of East Barnet) for the purification of their effluent, by which the sulphocyanides existing in the proportion of 0·29 per cent. are largely removed, together with the tarry matter and sulphide compounds. The result is that so pure an effluent is obtained that the Gas Company are able to use it for general purposes on the works. But here arises a peculiar point. After they had adopted the process, and were putting to use the whole of the effluent on the works, and none of it was passing down the sewers, the sewage manager even then reported that the Company were destroying the bacteria beds. On the other hand, Dr. Bower, the Medical Officer of Health, has reported that a mixture of 20 per cent. of the effluent with sewage does not affect bacterial growth to any extent. This proportion is greatly in excess of what occurs in practice, as in most cases the proportion would not be more than about 3 per cent. However, we hope that, now the Company have removed all cause of complaint, rancour or a desire for revenge on the part of any members of the Local Authority will not be allowed to blind them to the best interests of the ratepayers. It ought not to do so; for such a thing is not good administration. The process that has been adopted at Sutton will, we learn, also soon be in operation at another gas-works within the area of the Metropolitan Water Board. This is not the first time that Mr. Radcliffe's name as an inventor has appeared in our columns; for on May 2 last we described and illustrated a generator for the manufacture of gas that he has devised.

Municipal or Company Ownership.

It must not be taken that the paper and discussion on this subject which occupied such a large proportion of the time of the last meeting of the British Association of Water-Works Engineers are limited in their interest. By a conversion of terms, much of the argument may be applied to private enterprise and municipal venture of other kinds than water supply. At the same time, we are not convinced that the subject was a fit one for an Association composed of men serving respectively municipalities and companies; and although the author supplied a coating of sweetness to the bitterness of his pill, one cannot get away from the fact that Mr. Priestley's effort was a direct attack by vapid comparison on company administration, which administration is largely shaped, or at all events served, by fellow-members of the organization. To our mind, therefore, for such an Association the paper was not altogether in good taste; and its acceptance by the Council cannot be commended. But the members representing company interests who took part in the discussion suffered no disadvantage in point of strength of argument, notwithstanding that the municipal partisans, from the author of the paper downwards, argued as though their administration was *ne plus ultra*, and therefore irreproachable and unapproachable by the other side. If all they said is to be accepted, then, forsooth, the cream of ability must be all on their side—among the engineers and their changeable committees. Surely there must be some providential interposition in favour of municipal administration that these things should be so ordained. But are they? The company representatives much mauled the egoism of the municipal champions. It was the companies who originated the distribution of water in this country; and when the hard pioneer work had been finished, then, and not till then, the municipalities stepped in, and claimed that the work was, and should be, their

especial care. But it is a pity that their recognition of this had not earlier birth. That water supply is a "necessity" was freely spoken of as a reason why municipalities should have charge of it; and one member, whose fluency exceeded his wisdom on this question, laid it down as an indisputable principle that "the supply of a necessity was not municipal trading." If this principle were generally approved, the delight of the progressive and socialistic elements in local government would have no bounds. Bread and other foods are necessities, clothes are likewise, and many other things are the same. *Ergo*, according to this member, municipalities would be justified in annexing practically the whole of the trade of a district. There was no proof, however, that even in water supply consumers are a whit the better served by municipalities than by companies; but it was shown distinctly that while companies have always in mind ulterior tribulation for avoidable lapses in duty, consumers have no appeal or authorized champions as against a supplying municipality. And for the former reason, there is hollowness in the musty argument that companies think more of dividends than the fortification of their interests by well-doing. A great deal of illogical argument padded the discussion; and the bulk of it was not found on the side of the companies.

Transfers and Capital Costs.

There was a great deal of wild talk in the discussion over the reasons that so many undertakings have become municipalized. Dereliction of duty on the part of companies was the chief one. But when challenged for examples, it was not easy to point to them, save in one or two isolated cases which are very easy to balance by illustration from municipal supply. This is, of course, one of the shafts of the common bundle that is duly transported to the Parliamentary Committee-rooms time after time when a Bill for water transfer is promoted. But this is not proof of real existence. The greater reason why Parliament has allowed so many compulsory water transfers is no doubt that water (unlike gas as one form of illuminant) is a monopoly free of competition, and that the authority responsible for the sanitary condition of its area has some unexplained legitimate right to the supply of water. This does not in any way prove remissness on the part of a company in prior possession in dealing with their trust. On the financial question, the author himself showed that the municipalities, in respect of capital, are not providing their supplies so cheaply as the water companies. He disclosed that, per head of population, their average capital costs are nearly 50 per cent. more than those of the companies, leaving out of consideration the authorities who have gone in for exceptionally large schemes. As a matter of fact, the comparison shows the municipalities in a worse light; inasmuch as, in the majority of cases, they are supplying densely populated cities and towns, while to a large extent to the companies have been left the sparsely populated districts, where on the *per capita* basis the cost should be much higher than in the cases of the closely populated areas.

Further Financial Points.

There was no evidence whatever in the discussion to show that local authorities are able to work any cheaper to the advantage of the consumers than the companies, though it was airily claimed that they do so. A company's profits are rigidly regulated; and the average dividend that they pay on the shareholders' investments is not nowadays more than the municipalities have to pay for interest. In addition to what the companies have to find, the latter have to provide the sum necessary for sinking fund, which is a burden that the companies have not to bear. Again the Corporations are not averse to giving, if they can, some profit to go in "relief of the ordinary rates," which rates, as a consequence, have no downward tendency from their highest attained point. It is an ideal condition of things that the author suggested (with which we agree) when he said that no profit should be made by the local authorities on the provision of water; but it is one that most municipalities would send to the four winds, unless they are prohibited from making profit—that is to say, regarding profit as being money realized beyond the fixed charges and authorized funds. These considerations satisfy that the word "profit," which was much bandied about in its application to companies during the discussion, has no more significance in their case than in that of local authorities, if as much. Furthermore, there was quite a conspicuous omission, in referring to the relative rates charged, of the fact that it is far from an unknown thing for a municipal water undertaking to have to be subsidized from the general rates in order to pay the standing charges; and this assuredly is part of the price the consumers have to pay for their municipally furnished supply. This is a condition of things that would not have occurred in the case of a company. As to the quality and quantity of supply, there was nothing to show that the consumers have anything to choose between elective and private administration. Over the former, they have little or no control; over the latter there is all the control that parliamentary and other ingenuity can devise.

Inverted Burner Litigation.

In another part of to-day's issue there will be found a full report of a lengthy judgment delivered by Mr. Justice Buckley last Wednesday in an action brought by the New Inverted Incandescent Gas-Lamp Company in connection with an alleged infringement of their patents. The defendants in this case were Messrs. Cope and Timmins, Limited; and the conclusion arrived at was the same as that of Mr. Justice Joyce in the action by the same Company against the Globe Light Company, Limited—that the two arrangements complained of were not infringements of the plaintiffs' patents. These patents were No. 5769 of 1900, granted to J. Bernt and E. Cervanka, and No. 265 of 1903, granted to Armand Farkas. The hearing of the present case took some time; and Mr. Justice Buckley went fully into the patents and the alleged infringements in the course of his judgment. He pointed out that the idea of the two patents on which the plaintiffs relied was to secure coolness of the apparatus, instead of adopting the principle of regeneration; an "isolator," made of preferably bad heat-conducting material, and a deflector being employed for the purpose. He realized the use of the deflector to keep the hot air away from the sides of the burner; but he confessed to the greatest difficulty in understanding what was meant by the "isolator," owing to the fact that the specification merely said it was to be of "preferably" bad heat-conducting material. He said the result of the evidence was that to call a brass tube an isolator in any sense, in the case of a patent for burning gas and air in a bunsen burner, was absurd. If the word "isolator" used in one of the patents meant a metal tube made of the best, or of an exceedingly good, conductor of heat, the patent must be bad; while if it meant a thing which was intended to keep cool, then the defendants had no isolator—"they neither kept the burner cool, nor, if they did in any sense keep it cool, did they adopt the plaintiffs' means of keeping it cool." It may be pointed out that Mr. Justice Buckley, having found that the two arrangements referred to were not infringements, did not give any decision on the question of the validity of the patents, which had been raised by the defence.

Some Rating Statistics.

Nowadays it is impossible to remain for any great length of time without having the question of rating brought to one's attention in some form or another; and only too often this form is an unpleasant one. But not always; and the present instance is a case in point. As regularly as the close of each year comes round, do we receive from Mr. James Carter, the Borough Treasurer of Preston, that proof of his industry which is furnished by his annual compilation of statistics relating to the rates levied in various towns, together with the charges for gas, water, and electricity, and the receipts from profitable undertakings by which the rates in the towns have been reduced. The information contained in the tables is of the same character as hitherto; but the number of towns included still manifests an increasing tendency—there being one more than last year, which in its turn exhibited a growth of five over the preceding twelve months. The statistics are, of course, interesting; and their preparation must be to Mr. Carter a labour of love. So far as they go, too, they afford information which might prove of value to prospective manufacturers in doubt as to where it would be best to lay down their works. Every year the question of rates becomes a more important item in connection with the carrying on of commercial operations; and this means that, other things being equal, there will be an increasing disposition to regard a town as being

attractive or otherwise just as its rates happen to be low or high. The "other things" are, of course, not always equal; and in many instances doubtless the additional amount that may be paid in the shape of rates secures to the citizens corresponding advantages. It is not always so, we know; but the fact that it may be, is one that it is always necessary to bear in mind. The figures on the present occasion, as usual, exhibit some wide variations; and there are some changes in the relative positions of towns as compared with last year. Among Mr. Carter's list, West Ham and East Ham are this time the highest rated (being both well over 10s. in the pound); but then Poplar is not included in it. Last year Wolverhampton was the highest of the places named; but the position is greatly changed now; for while this town shows a substantial decrease, the two Hams come out with an increase that puts them very well ahead. At the other end of the list comes Oxford, with an amount considerably under 5s. The list contains the names of 89 towns; and of these there are 26 cases in which the rates levied total to 8s. or more in the pound. This, it may be remarked, is a little less favourable than in the previous year, when the number was 23. It is gratifying to see that among the towns enumerated by Mr. Carter there are no less than eleven in which the price of gas is 2s. or less per 1000 cubic feet. The pride of place in this respect is once again easily held by Widnes, with the truly excellent figure of 1s. 4d. per 1000 cubic feet, with a lower rate for very large consumption, and a charge of 1s. for gas used in engines.

The Case of Manchester.

Manchester is one of the places included by Mr. Carter in his returns; the population being given as 631,185, the rateable value as £4,083,119, and the total rates at 8s. 0¼d. Here the Ratepayers' Association are seriously taking the matter in hand; a deputation having waited on the Lord Mayor to present two resolutions passed at a recent meeting. The first of these protested against continued municipal extravagance, and submitted that any further increase in the rates must be inimical to the prosperity of the city; while the second one called for the co-operation and the assistance of influential ratepayers by taking their part in municipal management. The spokesman said that the Association considered that 8s. in the pound on the colossal rateable value of Manchester ought to be more than ample to meet all that was required; and they thought no further applications for money should be made till something had been paid off. To this the Lord Mayor replied that he did not understand why they fixed 8s. as a reasonable limit; for he regarded this figure as a good deal too high, and would like to see the rates much lower. No doubt so also would the Ratepayers' Association; but they were evidently desirous of being as moderate as possible in their demands. Another point dealt with was the Finance Committee, which the deputation were of opinion needed re-arrangement. Their suggestion was that a Finance Committee should be formed, not a member of which should be on any other Committee, so that "they would not be interested in getting anything through." Such a Committee, with ample power granted them, should certainly be able to act as a check on all the spending departments of the Corporation; and if there are no insuperable difficulties in the way, it would be interesting to see a trial made in this direction. Meanwhile, it is significant to note that the Lord Mayor called the attention of the deputation to the fact that a resolution is down for the next Council meeting, asking for a Special Committee to be appointed to consider and report on municipal expenditure. Whether this proposition be carried or not, its formulation may be taken as an indication of dissatisfaction at the existing state of affairs.

The Electricity Supply Question in London.

It is reported that one of the early administrative acts of the new Government will be to recommend the appointment of a Royal Commission to consider and report upon the issues involved in the several proposals that have been made regarding the supply of electricity in London. This is a course that has been advocated in these columns from the time that the Administrative Company's scheme first made its appearance. The question is one that involves not only the provision of cheaper electricity for power purposes in London, but there are statutory interests and private and public investments to be safeguarded, as well as the protection of the occupants of the subsoil of the streets in virtue of parliamentary enactments, among which occupants are the Gas Companies, with their enormous reticulation of high and low pressure means of distribution. It would also be an excellent thing for the ratepayers if the inquiry were extended to comprehend the scandalous and wasteful municipal methods of managing their electric lighting undertakings, instances of which form the greater part of the subject-matter of our "Electric Lighting Memoranda" this week. But if we have a Government constituted as at present—with Mr. John Burns at the Local Government Board, and Mr. Lloyd George at the Board of Trade, unless ministerial appointment results in a change of spectacles—there is not much likelihood of this branch of the question coming under review. However, it is to be desired, in view of the magnitude of the general question, that the reported intention of appointing a Royal Commission has substantial foundation.

PERSONAL.

Mr. C. W. S. OLDHAM, who for the past seven years has been Assistant Engineer at the City of Hull Water-Works, has been appointed Engineer and Manager to the Ipswich Water-Works, in place of the late Mr. Hamlet Roberts, whose death was noticed in the "JOURNAL" some short time ago.

Last Saturday week the officials connected with all the gas-works in the Isle of Wight entertained their colleague, Mr. H. J. IBBOTSON, the Engineer and Manager to the Newport Gas Company, to a complimentary dinner at the Railway Hotel, Sandown, on the occasion of his retiring from that position. It was made the occasion for presenting him with a handsomely-fitted dressing case, given by the Isle of Wight Gas Association, on his departure at a very early date for Japan. The presentation was made by Mr. R. Fish, of East Cowes, who referred in glowing terms to the conspicuous ability and business-like capacity displayed by the recipient in guiding the fortunes of the Newport Gas Company during the five years he had occupied the position of Engineer, and wished him a hearty "God speed" to that other Britain in the Eastern Seas, which is now our close ally. Other speakers following, and wishing Mr. Ibbotson success in his new venture, were Messrs. F. F. Farrand, of Ryde; Gilbert, of Bembridge; and J. S. Ineson, of Ventnor. The recipient responded in felicitous terms.

The Compartment Cooking Apparatus.

For use with ordinary gas-cooking stoves, grillers, or rings, the boiling utensils have commonly a separate existence; but in several places abroad—Sweden, for example—gas and oil stoves are in use, the boiling portions of which are part and parcel of the heater. Herein we get the justification for the title above. It is applied to a form of this class of heater to which Messrs. Wilheim Meinhardt and Co., of No. 5, Lloyd's Avenue, E.C., ask attention. Imagine a base shaped as would be a cased-in boiling-ring, with, fixed on top, a cylindrical body separating into parts or compartments; and that is the stove complete. The first compartment consists of a receptable for water. Inside this is a strainer for the making of tea or coffee. In the second compartment eggs or vegetables can be boiled by steam; and a third compartment is constructed for draught only. In addition, two pans are provided—one for boiling milk or soup, the other for frying. The whole arrangement has a compact appearance. Whether it is an appliance that will stand the rough usage here is another matter; but, as a low price is asked for it, every gas manager can form his own judgment. For baking, the boiling-compartments can be removed from the burner base and be replaced by an oven.

Smoke Abatement Exhibition.—In addition to the awards noticed last week, we understand that Messrs. Fletcher, Russell, and Co., Limited, have received a certificate entitling them to a bronze medal for a gas-heater with safety-taps.

Society of British Gas Industries.—We are asked to remind those firms who have not yet sent in their application forms for membership, that it would be a great convenience to the Provisional Committee if the forms are received by Mr. Clare by the 30th inst.

Donkin on Gas, Oil, and Air Engines.—We have received from Messrs. Charles Griffin and Co., Limited, the fourth edition of "Gas, Oil, and Air Engines." This well-known work, it may be remembered, was first produced by the late Mr. Bryan Donkin in 1893, and the present edition has been brought up to date by his Secretary. Pending the fuller notice of the book which we hope to give in an early issue, it may be said that the noteworthy changes since the publication of the third edition have been the increase in size and efficiency of internal combustion engines, the utilization of blast-furnace gases, and the improvement in the internal working of both gas and oil engines. These matters are dealt with in the volume just issued, and the tables of trials have been brought up to date and several additions made to them.

WATER AFFAIRS.

The Principal Events of the Year.

In glancing over the events of the year now drawing to a close, it cannot be said that any of them have been of conspicuous importance, so far as water supply and the subjects associated with it are concerned. The year has not been marked by the achievment of any undertaking of the magnitude of the Birmingham Water-Works, which formed so prominent a feature in the record for the preceding twelve months; nevertheless in the period under consideration works have been completed which have rendered the undertakings with which they are connected more capable of meeting the demands upon them, while others have been commenced with this object in view. The two unsatisfactory features in the year's progress have been a long spell of dry weather in the summer months and the early autumn (compensated for, however, by copious rains in the late autumn), and the epidemic of typhoid fever at Lincoln. Had it not been for these—especially the latter—it might have been said of the water affairs of 1905 that they have not been overshadowed by any dark clouds. At the same time, they have been by no means devoid of interest, as we think will be seen from the following review.

Starting with the Metropolis, the present year has been the first complete one, for the purposes of the present retrospect, under the control of the Water Board, who came into possession of the Water Companies' undertakings on June 24, 1904, and consequently at the close of the year had only been for six months responsible for the service. Briefly stated, the Board's work during the current year has consisted mainly of reorganization. At a meeting in February they sanctioned a scheme submitted by the Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.) for effecting an interchange of water between the Southwark and Vauxhall and Lambeth districts, whereby a better pressure could be given to the higher areas, with resulting reduction of pumping and other expenses. In the closing days of 1904, the water in the Staines reservoirs was brought into use; and at a meeting in April it was decided to complete the communication works commenced by the New River Company, and connect them with the reservoirs, so as to complete the scheme. In connection with the Board's storage plant, it should be recorded that in October the final payment was sanctioned for the Banbury and Lockwood reservoirs undertaken by the East London Water Company, which were practically completed before the day on which the Board took possession. Owing to the choking of the filter-beds of the Lambeth area, in consequence of the unusual turbidity of the Thames water through heavy rains in June, an unfortunate shortage occurred in a portion of the area, and directed the Board's attention to the inadequacy of the filtration plant; the result being that it was decided to proceed at once with the construction of six acres of filter-beds on land at Hampton. Shortly afterwards the Board sanctioned an important scheme for works in the Lea Valley to improve the supply of water from the river, at an estimated cost of £685,000; and notice has been given for a Bill to authorize their construction. Several other important new works were sanctioned, including the completion of the Honor Oak reservoir, for which borrowing powers were sought of the Local Government Board. Quite early in the year the Board had before them, at the suggestion of the Westminster City Council, the question of the levying of the water-rates by precept upon the Local Authorities, and having them collected with the other rates. They decided to deal with the matter in connection with the subject of the equalization of the rates, on which it was intended to promote a Bill in the session of 1906. This, however, they subsequently found they would not be able to do, the difficulties attending the framing of the Bill having been far too great. Some important changes have taken place in connection with the *personnel* of the Board; the services of several of the officials of the Water Companies being dispensed with, and the work concentrated. One result of this was the appointment of Mr. J. W. Restler, the Engineer of the Southwark and Vauxhall district, as Deputy Chief Engineer of the Board; while others were the improvement of the position of the Comptroller (Mr. F. E. Harris), and the appointment of Mr. C. J. Howell Thomas as Estate Clerk. In the department of water examination, Dr. Percy F. Frankland was relieved of the duty of examining the water supplied to the Kent district; and the appointment of Dr. A. C. Houston as Director of Water Examinations led to the resignations of Sir William Crookes and Sir James Dewar, who for twenty-five years had presented monthly reports to the Official Water Examiner (Mr. Charles Perrin, M.Inst.C.E.) on the chemistry and bacteriology of the Metropolitan Water Supply. The Board issued their first annual report early in April, and they approved of the draft of the second at their meeting on the 8th inst. They have not been exempt, any more than their predecessors were, from criticism; but, looked at all round, their work has not given much cause for really serious complaint.

Turning from the Metropolis, probably the most noteworthy event of the year, so far as new works are concerned, was the inauguration on the 28th of September of the Talla scheme for increasing the supply of water to Edinburgh. This work was decided upon about eleven years ago, on a report by Messrs. J. M. Gale, G. H. Hill, and the late James Mansergh; and an Act sanctioning it was obtained in 1895. The gathering-ground extends to nearly ten square miles; and it is estimated to yield about 14½ million gallons of water per day, one-third of which is required for compensation; leaving 9½ million gallons available. The work was estimated to cost about £750,000; but, owing in a large measure to the scarcity of labour, the outlay upon it has been £1,143,220. The new supply of water reached the city the morning after the opening ceremony; and not a day too soon, for a few weeks previously the store of water in the reservoirs was lower than it had been for ten years, and, unless it had been augumented, it would have lasted only eighty days. Another instance of the completion of a work bringing welcome relief occurred in the case of Liverpool, which about the middle of October had its water supply increased to the extent of 16 million gallons daily through a second pipe-line laid from Lake Vyrnwy to a reservoir at Prescot. The city had been suffering from a restricted supply, and, as in the case of Edinburgh, the water in the reservoirs was very low; but, unlike the Scottish Metropolis, the work which helped to replenish them was carried out for £50,000 less than the estimate. Early in the year, the Bristol Water Company brought into use their new Blagdon reservoir, having a capacity of 1700 million gallons; and a few weeks later a new covered service reservoir and a water-tower, constructed for the Wallasey Urban District according to the plans of their Engineer (Mr. J. H. Crowther), were inaugurated. In March, the new works designed for Todmorden by Mr. G. F. Deacon, and capable of furnishing a daily supply of 621,000 gallons, were formally opened. Towards the end of June, a new water-tower having a capacity of 40,000 gallons, erected in accordance with the designs of Mr. J. Shaw, the Manager, was utilized by the Boston Water Company for affording a more regular day pressure in the town. In September, a new reservoir, capable of holding 716,000 gallons, was formally opened at Chelmsford; and another, of 300 millions capacity, at Douglas (Isle of Man). A few weeks later, an interesting piece of engineering work carried out by Messrs. J. Quick and Son for the Portsmouth Water Company, consisting of the tunnelling of the Hilsea Creek, to carry the mains to afford a direct supply of water to the Dockyard, was successfully accomplished. Early in October, the scheme for the supply of East Stirlingshire with water, which had been in progress four years, and had been carried out at a cost of £112,000, exclusive of land, was inaugurated. Water supplies have been afforded to several smaller towns, notably Catisfield, near Fareham, Fairburn, near Pontefract, Lossiemouth (N.B.), Long Buckby, Middlewich, Robertsbridge, Saffron Walden, and Woolacombe and Mortehoe, near Ilfracombe. The Runcorn Urban District Council a few weeks ago sought the authority of the Local Government Board to a project for obtaining a supply of water from the Vyrnwy main of the Liverpool Corporation. Good progress has been made during the year with works in hand. Some large pipe contracts have been entered into for the Derwent Valley Water-Works, and one has been placed for the principal reservoir in the Geltsdale scheme of the Carlisle Corporation. The Walshaw Dean reservoir of the Halifax Corporation, and the storage reservoir which the Corporation of Torquay are constructing in the Trenchford Valley, are both nearer completion than they were twelve months ago; while the works at Loughborough, Rhyl, and Selby have been pushed on with as much speed as possible. New works

have been commenced or projected during the year for improving the water supply in a number of places, the most important being Aberdeen, Ashton-under-Lyne, Bolsover, Brighouse, Bury, Cheltenham, Croydon, Dublin, Leeds, Newtownards, Shanklin, Shrewsbury, Skipton, and Troon (N.B.). The South Staffordshire Water Company recently decided to undertake works at Burton-on-Trent to improve the supply at Winshill. Applications have been made for authority to raise money for carrying out extensions at Chesterfield, Chorley, Croydon, Halifax, Hereford, Penzance, Plymouth, Portadown, Taunton, Teignmouth, Warrington, Warwick, and Wolverhampton. In connection with new works, it should be mentioned that towards the close of September Birmingham had the first supply of "all Welsh" water.

Passing from the works actually completed or in progress, those sanctioned by Parliament in the past session may be shortly noticed. Taking Companies first, the Brompton, Chatham, Gillingham, and Rochester Water Company and the Truro Water Company obtained authority to construct additional works and raise more capital. Neighbours of the former Company—the Higham and Hundred of Hoo Water Company—were granted an increase of capital; and the Rhymney and Aber Valleys Gas and Water Company were allowed to treat the two branches of their business as one undertaking and augment their capital. Similar permission was given to the Western Valleys (Mon.) Water and Gas Company. The Skegness Water Company was incorporated, with a capital of £30,000, to take over the private water-works of the Earl of Scarborough, and extend them. The District Council have power to purchase the undertaking, provided they apply to Parliament for authority to do so within three years from the passing of the Act. The South Oxfordshire Water and Gas Company (formerly the Thames Valley and Goring Water and Gas Company, Limited) obtained the sanction of Parliament to a comprehensive scheme of gas and water supply which was fully noticed in our articles dealing with the gas and water legislation of the session. With regard to the Local Authorities, probably the most extensive series of new works authorized by Parliament was in the case of the Bolton Corporation, who were empowered to construct five reservoirs, six aqueducts, and other works. The Accrington District Gas and Water Board obtained authority to enlarge their Dean Clough reservoir, at Great Harwood; and power was granted to the Colne, Hythe, Loughborough, Mansfield, Morley, and Nottingham Corporations, as well as to the Bangor, Malvern, and Rhondda District Councils, to carry out storage and distribution works, the nature of which has already been indicated. The Birmingham Corporation obtained some amendments of the Acts relating to their Welsh scheme; the Bangor (Co. Down) District Council and the Blackpool Corporation were granted powers in regard to the supply of sea water; and the Southport, Birkdale, and West Lancashire Water Board were authorized to construct works and purchase certain pipes and other apparatus belonging to the Earl of Derby in the parish of Bickerstaffe. Provision was made in some cases for the supply of water from one authority to another; and by the Bolton Act Manchester may sell water outside that borough. Altogether, the water legislation of the year, whether by Acts or by Orders, marked progress rather than introduced new features. The Sunderland and South Shields Water Company went to Parliament for sanction to a very important extension scheme; but as the Select Committee required the insertion in the Bill of a provision for softening the water, which would have entailed an outlay of between £150,000 and £200,000 on plant, it was decided not to proceed with it. The Torpoint Urban District Council applied for authority to construct works to enable them to afford a better supply of water in their district, as well as to the Admiralty and the War Office. Owing, however, to the objections raised by the owner of an estate adjacent to the site of the proposed works, the House of Lords rejected the Bill.

Turning from the parliamentary to the legal business of the year, the two principal cases which occupied the Courts were actions in regard to alleged damage to works. The first was brought by Messrs. Ridley, Whitley, and Co., Limited, against the Metropolitan Water Board and Messrs. S. Pearson and Son, Limited, to recover compensation for damage occasioned to their premises through the flooding of the River Lea. The works which it was alleged had caused the damage had been constructed by Messrs. Pearson for the East London Water Company, and the firm were joined as co-defendants with the Board. The Company had obtained powers to construct a reservoir and make an aqueduct or cutting for the diversion of the river opposite the plaintiffs' works; and it was alleged that the reservoir practically imposed a barrier to the flow of the water both in the river and in a small feeder canal, and that this and other works caused the damage complained of. The defence was that it was due to the prevalence of unprecedented floods. The case occupied Mr. Justice Kennedy six days; and, after taking time to consider his judgment, he eventually gave it in favour of the defendants, with costs. The other action was brought by the Manchester Corporation against the New Moss Colliery Company, Limited, to restrain them from working minerals under lands adjacent to one of their reservoirs so as to injure it and other works. The whole case turned on the construction of the sections of the Water-Works Clauses Act, 1847, specifically dealing with the working of minerals; and Mr. Justice Farwell, after hearing arguments and evidence for eight days, came to the conclusion that the plaintiffs had failed to substantiate their claim. He therefore dismissed the action, with costs; but his decision is to be appealed against. The Higher Court had before them in August an appeal from a judgment of Mr. Justice Swinfen Eady on the question of the validity or otherwise of certain agreements which existed between the Soothill Upper Urban District Council and the Wakefield Rural District Council, by which the former agreed to supply water to the latter for certain districts. The sanction of the Local Government Board had not been obtained to an agreement dated January, 1895; and, further, no pecuniary penalty was specified in it. On these grounds, the Rural District Council declared it to be void. His Lordship held that the sanction of the Board to an earlier agreement covered the later one, which was not void by the omission of the penalty clause. The Court of Appeal, consisting of Lords Justices Vaughan Williams, Romer, and Stirling, reversed the first portion of the judgment, but sustained the second (the first-named learned Judge dissenting). The appeal was therefore allowed.

In addition to the case already mentioned, the Metropolitan Water Board have been engaged in legal proceedings which in some cases have laid them open to public criticism. Possibly the sharpest rebuke was administered by Mr. Cluer, the Magistrate at Worship Street, in a case, tried in July, in which the Board had cut off the water from some premises without giving any notice, and they were summoned by the owner for "neglecting and refusing" to furnish a supply. The Magistrate characterized the Board's proceedings as "childish," and though he had to dismiss the summons, he expressed his regret at having to do so. Shortly afterwards, the Judge at the Westminster County Court decided that the Board were not entitled, upon the construction of the Lambeth Water Acts, to charge for a bath. They were, however, more successful later in the year in the same Court, in a case of a disputed charge for high service and a garden, in another in connection with the water supply to flats, and in a third in which they were sued for damages for personal injuries caused by a stopcock box. The Board were also successful in their appeal from the judgment of the Divisional Court on a special case stated by one of the Metropolitan Magistrates on the question of the right of the Westminster City Council to charge 10 per cent. on the cost of doing certain work in making good the roads after they had been opened to repair the water-mains. Other legal proceedings connected more or less with the Metropolitan Water Supply were those taken by the Chiswick Urban District Council against the Board to test the question of the right of the residents in the district formerly supplied by the West Middlesex Water Company to a rebate upon their water-rate. The matter came before Mr. Justice Joyce, who dismissed the action. In connection with the winding up of the Lambeth Water Company, it was held by Mr. Justice Warrington, in a friendly action brought by a stockholder, that the Directors could not legally distribute a sum of £8000 in gratuities to officers and workmen. Mr. Meadows appealed successfully from the decision of Deputy-Judge Fitzroy Cowper, at the Marylebone County Court, which was adverse to him in a dispute with the Grand Junction Water Company in regard to the recovery of money paid *bonâ fide* in error. The last point calling for notice in connection with the Metropolis is the loss by the shareholders of the New River Company of the privilege of being electors for the county of Middlesex.

A case of considerable importance, involving as it did the question of the right of the North-Eastern Railway Company to supply water for the purposes of their dock at Hull, occupied the attention of Mr. Justice Joyce for several days. It was brought by the Attorney-General, at the instance of the Corporation of Kingston-upon-Hull, who formerly supplied the dock, with the object of obtaining a declaration by the Court that the Company were acting *ultra vires*. The facts of the case have been so recently reported in our columns that it is only necessary to record here that the plaintiffs were unsuccessful. Several disputes have arisen during the year in regard to the supply of water. First in importance stands that at Bury, which came before the Lord Chief Justice and Justices Kennedy and Ridley on appeal from a decision of the local Justices, who stated a case for the opinion of the Court as to the meaning of the words "annual rent-rack or value" in the Special Act of the Bury and District Joint Water Board. The appellant was the owner of three cottages let to weekly tenants, he paying the rates. The Board claimed to assess him at the gross sums he received; while he contended that he could only be assessed on the net amount he had after deducting the rates, among which the water-rate itself was included. Their Lordships thought it was impossible to maintain the position taken up by the Board. It was estimated that the decision would make a difference of about £4200 in their revenues. One of the Sutton Water Company's consumers who, by agreement, was being supplied by meter, objected to pay on the rack-rent of his premises, on which the Company claimed they had a right to charge; and they maintained it. A firm of builders at Stoke Newington were made to understand that when they could not come to terms with the suppliers of water as to the price to be paid for it, they must not help themselves from the nearest unoccupied house. Similarly, a baker at Wix, whose water supply had been cut off, found that he could not with impunity obtain a supply from a cottage occupied by another man. At Rochdale, a miller was fined £5 for wrongfully using water taken from one of the pipes of the Corporation. On the other hand, the Brightlingsea District Council failed in an attempt to make a fishmonger pay for water used for his horse and trap which he stabled in the Royal Hotel yard. Several disputes as to the rating of mains occurred during the year. Two actions were brought by the Corporation of Chichester against a firm of contractors for compensation for damage done to their water-mains by a traction-engine; and they were successful in the County Court. The defendant sought ineffectually to have the decision reversed; the Lord Chief Justice expressing the opinion that the judgment appealed from was perfectly right. In an action brought against the South Staffordshire Water Company for compensation for damage resulting from a burst main, they admitted their liability and settled the case. A claim made against the Huddersfield Corporation by certain woollen manufacturers for damages caused by obstruction of the plaintiffs' water rights, and for alleged nuisance and negligence, was sustained, though not with the unanimity on the part of the Jury which the Judge (Mr. Justice Ridley) said he could have wished. A claim by a contractor to recover £12,155 from the Stockport Corporation for work done in connection with one of the reservoirs at Kinder was heard by Mr. Justice Walton, in Manchester, in July, with the result that his Lordship undertook to settle the question of what the plaintiff was to be paid, and reserved judgment on points of law. The matter was before him again in London last week, but was left unsettled. Another dispute in connection with a reservoir occurred at Teignmouth. The Council were dissatisfied with the Contractor's work; and Mr. Erskine Pollock, K.C., the Official Referee, awarded them £2000. The Contractor appealed—to the Divisional Court and also to the Court of Appeal; but he failed in both. At Chesterfield, the Staveley Coal and Iron Company refused to pay the water-rate on the ground that the quality of the water was bad; but they were told they must pay, and appeal to the Local Government Board. The Contractor for the new works of the Coventry Corporation at Foleshill was held to be liable for polluting the river at Coventry, as were the Halifax and Edinburgh Corporations for causing the pollution of wells. Mr. W. H. Lever obtained a decision by Mr. Justice Warrington in an action brought by him to compel the Liverpool Corporation to complete the purchase of his Rivington Estate under the award of Mr. R. E. Middleton.

Related as they are to legal proceedings, reference may be conveniently made here to the arbitrations which have taken place or of which the results have been announced during the year. In January, Mr. J. H. Hanson made his awards in the claims against the Bradford Corporation in respect of certain estates in the Nidd Valley required for their water-works. The long and costly litigation arising out of the purchase of the undertaking of the Devonport Water Company by the Corporation has received a fresh lease of life. The Arbitrator (Mr. A. J. Ram, K.C.), it will doubtless be remembered, made an award in which alternative amounts were named, and stated a special case, which, towards the close of the year 1904, Mr. Justice Phillimore decided in such a way as to render both parties dissatisfied. The matter was taken to the Court of Appeal, who sent the case back to Mr. Ram for further facts to be stated. The Leeds Corporation have been engaged in an arbitration respecting their Colsterdale reservoir, in connection with which some rather extraordinary statements have recently been made. The Bath Corporation have also been in an arbitration respecting a claim for compensation arising out of the compulsory acquisition of water rights under their Act of 1903. The claimant asked for £3628, and he was awarded £1090. Although outside the United Kingdom, the great arbitration instituted to determine the amount to be paid by the Rand Water Board for the three local water undertakings, may be mentioned. The Water Company claimed £4,299,900 and were awarded £1,281,185; the Vierfontein Syndicate asked for £546,805, and they obtained £477,754; and the Braamfontein Company, who wanted £160,875, were given £45,450. It was estimated that the other liabilities devolving upon the Board would bring up to £2,224,000 the total amount paid for expropriation.

Coming to the general events of the year, the dry weather claims first notice. Leicester was one of the earliest places to show signs of shortage; the store of water in the reservoirs at the end of January being deficient to the extent of 721 million gallons. About a month later it was 820 million gallons short; and trouble has been experienced all through the year. At the end of September it was stated that the town had not been in such straits in regard to its water supply since the service was instituted in 1854. Other places which were affected more or less by the dry weather were the Cleveland district, Harrogate, Liverpool, Loughborough, Otley, and other Provincial towns, especially in Yorkshire. In Scotland also the scarcity was severely felt, particularly in Edinburgh, St. Andrews, and in the East. Shortage of water owing to the breakdown of plant or the bursting of mains occurred at various places, notably at Cork and Pontefract, as well as in South London. Inconvenience arising from these causes and the drought was, however, as nothing compared with the disastrous effects of an outbreak of typhoid fever at Lincoln early in the year, as the result of contaminated water supply. In the middle of February there were 600 patients under treatment, but a few weeks later the number rose to 812, exclusive of 53 in surrounding villages. The epidemic then began to subside, and by June it was practically at an end—not, however, before it had attacked 1044 persons, caused 120 deaths, and involved the town to the extent of £7000 (equal to a rate of 4s. in the pound) and 77 actions. But it had the effect of bringing home to the Corporation the necessity for pushing on with the works in hand, and undertaking others, to improve the supply to the city; and it also showed how, in such a calamity, one town may help another—auxiliary supplies having, during the prevalence of the epidemic, been furnished from Gainsborough and Newark. The year has not been free from accidents; but happily there has been nothing in this country approaching the seriousness of the catastrophe of the collapse of a reservoir at Madrid.

Turning to some less unpleasant events in connection with the supply of water, it may be recorded that early in July the final arbitration proceedings incidental to the transfer of the London Water Companies' undertakings to the Metropolitan Water Board took place; and the affairs of the Companies are now being wound up. The New River Company, however, has been registered as a limited liability undertaking, and is continuing its existence as a land company. Reference to the transfer of the London Water-Works leads us to mention that the Chapel-en-le-Frith District Council purchased early in the year the works at Dove Holes; that the acquisition of those of the Scalby Water Company by the District Council have been sanctioned; that the New Mills District Council have decided to purchase those from which the town is supplied; and

that purchase proposals have been under consideration or else have been carried into effect at Crewkerne and several other places.

With regard to the technical side of water supply, the year has witnessed two meetings, full of interest, of the British Association of Water-Works Engineers; a report of a portion of the proceedings at the second of them (held on the 16th inst.) appearing elsewhere to-day. The Association took an active part in the movement, initiated by the Plumbers' Company, for the framing of regulations in regard to fittings; and the Secretary (Mr. Percy Griffith, M.Inst.C.E.) lent valuable assistance in drafting them. The water supply of Gloucester and Kettering occupied the attention of the Municipal and County Engineers at two of their meetings; and the filtration of water was discussed at a conference held by the Royal Sanitary Institute at Hastings. In November, there was held in Paris the first meeting of a newly formed Association of Foreign Municipal and Sanitary Engineers. What may be called "stock" subjects—such as river pollution, the protection and conservation of areas of water supply, and afforestation—have been kept alive during the year; and the "Lancet" tried to get up a scare about Thames water. An endeavour was made to show that there is a large store of water under London; and an investigation was started into the merits of "dowsing." A very determined attempt has lately been made in Glamorganshire to secure Welsh water for Wales; and a Water Board has been proposed for a considerable district of Mid Sussex.

Before bringing our retrospect to a close, a few personal matters call for notice. The past twelve months have witnessed several official changes, especially in London, and the removal by death of some who were at one time closely associated with the business of water supply. In March, owing to the serious illness of Mr. James Mansergh, his son, Mr. Ernest Mansergh, was appointed by the Stockport Water Committee Engineer of their Kinder scheme. That illness terminated fatally on the 15th of June, and removed from the ranks of water engineers one who had for some years occupied a prominent position. As the designer of the Welsh water scheme of the Birmingham Corporation, his professional services were fittingly acknowledged by the Water Committee at their first meeting after his death; and they also recorded their high appreciation of his personal qualities. Mr. John Morris, of the firm of Messrs. Ashurst, Morris, Crisp, and Co., who was a Director of several foreign Water Companies, died in March. About the same time, Mr. T. Hewson relinquished the position of City Engineer of Leeds, on account of failing health. He had for some years discharged the duties of Water-Works and Sewerage Engineer. The following month, Mr. C. G. Henzell was appointed Water Engineer. Early in May, the death occurred of Mr. F. H. Wybroo, the retired Secretary of the West Middlesex Water Company; and a few days later that of Mr. William Hack, the brother of Mr. Henry Hack, of Birmingham, and formerly Resident Engineer at the Hampton works of the Company. In October, the Ipswich Corporation lost an able Water Engineer, and the British Association of Water-Works Engineers an active member, by the death of Mr. Hamlet Roberts, whose successor is Mr. C. W. S. Oldham, of Hull; and towards the close of the month a similar sad event removed Mr. Allen Stoneham, who was for many years Financial Secretary of the Board of Trade, and Official Auditor of the gas and water accounts for the Metropolis. The deaths have also occurred during the year of Mr. E. Dennis, the Chairman of the Barnstaple Water Company; Mr. W. M'Landsborough, who for a long time held the position of Water Engineer at Cheltenham; and Mr. A. T. Walker, the Water Engineer to the Reading Corporation.

Tar from the Distillation of Wood.—M. Meyer has taken out a patent for the separation of the tar formed in the distillation of wood for pyrolineous acid. It is an attempt to provide an economical method of completely purifying the distillation products of wood from the accompanying wood tar by a process of continuous fractional distillation. Instead of passing the products directly into a condenser, as is now commonly done, the volatile matter is made to circulate through several chambers, arranged either alongside each other or one above the other. The vapours are made to pass through these chambers in a finely-divided condition; the chambers being kept at a convenient temperature. In this way the whole of the tar can be removed, and chamber liquids of different boiling-points obtained.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 917.)

SHORT as the business week preceding Christmas was, and with even that abbreviated period confronted with a closure of four days—viz., from Friday evening to the following Wednesday morning—yet it was not altogether devoid of feature; and it showed dispositions which, had they been afforded scope for development, might have been interesting. The opening was not propitious—being oppressed by apprehension as to Russian affairs—but, as courage like panic is contagious, the market grew easier in view of the calm on Continental bourses. The improved feeling lasted well, and the tone became quite cheerful. Discounting a good deal of what one hears, it seemed as if the prevailing feeling was that the New Year would open stronger, and there appeared to be more buyers than sellers. In the Money Market, there was at first a strong demand, and even some forecasting of a possible rise in the Bank of England rate on Thursday. On Monday, the discount houses put the rate on deposits up again. But the tension eased off; and though there are some who will have it that even now we are not quite safe from a rise this year, yet the chance is remotely improbable. Business in the Gas Market was about as quiet as might be expected. Changes in quotations were, equally as a matter of course, very few in number and small in degree; and the general feature of firmness and steadiness, which has now for some time past characterized the market, remained unimpaired. In Gaslight and Coke issues, the ordinary was quieter, and transactions were marked at from 103¾ to 102¼. The quotation was put down half a point, but there was not much sign of weakness. Among the secured issues, the preference marked from 111 to 112; and the debenture 86½. South Metropolitan was quiet but firm, transactions showing prices ranging from 132½ to 133½. The debenture was done at 87¾. One bargain in Commercial 3½ per cent. was at 114. Little was done in the Suburban and Provincial group. British marked 42⅞ and 43¼, Bromley "B" 93, and West Ham preference 125. Brentford old rose two points. In the Continental Companies, Union was a point higher, and marked 127 and 128; the preference marking 146. Imperial was a fraction better, at from 233½ to 234½. Tuscan was done at 9¾. Among the undertakings in the remoter world, Bombay marked 7, and Oriental advanced a point. Cape Town was done at 17 and 17¼, and ditto preference at 10$\frac{5}{16}$. Buenos Ayres changed hands at 12$\frac{9}{16}$ and 12⅝, River Plate debenture at 98, Primitiva ordinary at 7⅛ and 7$\frac{3}{32}$, ditto preference at 5¼, and ditto debenture at 98 and 98¼.

The closing prices are shown in our Stock and Share List on page 917.

ELECTRIC LIGHTING MEMORANDA.

London Rates—How Electric Lighting "Succeeds" at Hammersmith and Elsewhere—Waste and Fictitious Profits—Public Lighting at Finchley and Islington—Account-Keeping Extraordinary at Brighton—The Innocent Incandescent Electric Lamp.

THE detailed investigation that the "Standard" is still prosecuting into the rates problem of the Metropolis, goes on as spiritedly as when the subject last claimed our attention; and it is infusing into the minds of the ratepayers knowledge that the high rates are not so much a necessary accompaniment of enlightened civic polity as an effect of extravagance and of excursions beyond the safe and legitimate limits of municipal activities. The tyranny of our elastic forms of local government is being thrust upon the public—and very properly—by its painting by our contemporary in the deepest of dun colours. Among the boroughs whose finances have been recently dissected are those of Hammersmith, Chelsea, and Bermondsey. Here we must restrict attention to what is advanced in connection with the electric lighting concerns, and the adoption for public purposes of electric current. For these the ratepayers are pillaged; and the Gas Companies lose business, and have to pay for so doing. There are queer things happen in this world; and this is one of them. The Hammersmith Borough Council, it appears from what is published, are very proud of their electric lighting undertaking as being a "success;" but their pride is not shared by the ratepayers. A small amount of profit shown in complex electricity supply accounts does not constitute success. It would do so if all charges were properly made against the electric lighting undertaking; and if the ratepayers were obtaining electricity for public use at a rate that paid, and also showed there was economy in comparison with incandescent gas lighting. But the articles in our morning contemporary and the correspondence elicited have revealed that neither the one condition nor the other obtains in connection with this undertaking. The assessment of the concern is low. The rateable value has only been £3309; yet the capital expenditure on the works already amounts to £196,000. The Electric Lighting Committee and the Assessment Committee are falling out over a proposal of the latter to raise the rateable value to £9500. Perhaps the Assessment Committee are getting frightened over the revelations that have been made in this connection in regard to Poplar

and (we seem to remember) other places. It is a curious thing that these low assessments for electric lighting works should be allowed to exist, if the Borough Councils really desire to keep themselves above suspicion of unfairness between themselves and (say) their competitors the Gas Companies. It may not be generally known that, by the London Government Act, 1899, the duties of the Overseers in London were vested in the Borough Councils, who are therefore responsible for drawing up the valuation lists to be submitted to the Assessment Committees, who are also appointed by the Councils where the whole of a poor-law union is within a borough, and in other cases by the Guardians. This arrangement works very well—for the electric light undertakings. Light charges, through low assessments, are supplemented, to the advantage of present-day accounts, by the repayment of principal, in the case of Hammersmith, not being on a scale that a well-ordered company would provide for depreciation. These are deliberately adopted means for contributing to an improved financial showing. Another thing is that the public lighting expenses have since 1888-9 increased from £5134 to £8353. The arc lamps are being charged at £22 10s.; and sarcastic are the criticisms of correspondents as to the manner in which the lamps discharge their duty in respect of illuminating power. Capital expenditure on the undertaking is heavily increasing, and competition for the power business is manifestly near at hand. In view of all these facts, the small fictitious profit of the present does not look like hanging together long; and as to the profitableness of the future, hope is not unmixed with fear.

Chelsea is not such a prodigal Council in public lighting by electricity as several others; and consequently their public lighting accounts only show the difference (though it is quite enough) between £3939 in 1888-9 and £5378 in 1902-3. The chances, however, are that there would have been an addition to the latter figure of £600 if Kensal Town in the period had not been partitioned from Chelsea. But the Bermondsey Council, who are, like Battersea, strongly addicted to municipal "progress" by the popular municipal expedient of piling up debt, are having their cloak torn from them without the slightest respect, not only in the columns of the "Standard," but at a public inquiry which Mr. H. Carton Roberts, the District Auditor for the Local Government Board, was holding last week into the accounts of the electric lighting undertaking. It is not generally known that Bermondsey has a point of distinction about it not possessed by any of the other municipal undertakings—that is, that the old Vestry were given power by Parliament to compete in electricity supply with a private statutory Company. The dissection of the accounts by our morning contemporary shows a heavy capital account; and that a smaller annual expenditure than is proper is realized, to the detriment of later years, through the taking of full advantage of the privilege allowed by the County Council of deferring repayments of loans. The Electricity Department, too, charges the Borough Council an altogether unreasonable sum for the light given in the public streets. The arc lamps are extinguished at midnight; and after that hour the district is probably one of the worst illuminated (forgive the misapplication of the term) in London. It is, in fact, computed that at least £2000 a year might be saved by adopting incandescent gas lighting. Among other delinquencies of the Council, it is found that the amount debited against the undertaking for rates and taxes is only £414 a year, while the capital outlay has been fully £105,000. Two-thirds of the current supplied last year went to the Council themselves; and for this the ratepayers had to pay. Is not this a rate-supported undertaking, notwithstanding the Bermondsey clause? Respecting the inquiry by Mr. Roberts, the Council have to reckon with a Municipal Association, the members of which have long since tired of the uncontrollable spendthrifts that dominate the local government; and this Association have had all the facts at their command carefully brought to the knowledge of Mr. Roberts. Their nature was divulged in our "Memoranda" for Sept. 19; and we will not repeat what was then said. The Local Government Board Auditor, however, had plenty of material handed to him, upon which rather a sensational report could be founded if he so willed. There will doubtless be much eagerness in the borough to learn what will be officially said as to the flagrant abuse by the Borough Council of their powers. The Auditors of the Local Government Board unfortunately can only take cognizance of offences in the keeping of accounts, and report to the Board accordingly. Bermondsey is not the only borough in the Metropolis where an Official Auditor has been engaged within the last few days on the accounts of an electricity undertaking; and in this second case already with good effect. This refers to Walthamstow, where some serious allegations have been levelled at the keeping of the books of the electricity concern; and facts adduced by representatives of the Property Owners' Association have proved that the profit there is an absolute fiction, notwithstanding the support of the public lighting, on the lines of half the illuminating power of incandescent gas-lamps at double the cost. The representatives of the Property Owners' Association left the presence of the Auditor with his emphatic declaration ringing in their ears: "I believe the figures given, showing profits on the electric light are fictitious—absolutely fictitious." How do the Borough Council like that?

An instance of outrageous disregard for the interests of the ratepayers also comes from Finchley, and is given by a correspondent of the "Standard" signing himself "Economist," which is not an uncommon self-applied description in the addresses of candidates for place in municipal councils. Economy, however, is throttled by most of them when safely within the Council Chamber; for nothing like economy comes out again. Here at Finchley, the worst and most expensive of all forms of street lighting—incandescent electric lamps—has been adopted, at £3 per lamp per annum, for the sole purpose of contributing funds to the unremunerative electricity concern. We assert this to be the true reason, in view of the fact, presented by "Economist," that the Gas Company offered to furnish new and improved lanterns and incandescent burners, and supply them with gas for £2 10s. per annum, on a five years' contract. The ratepayers ought to be told a little more as to the relative illuminating power of the lights, and what they are directly losing in hard cash by the action of the District Council. Such egregious misappropriation of the ratepayers' money cannot receive protest too severe, especially as an Inspector of the Local Government Board had warned the Council that it is uneconomical to spend money on electric lighting for the streets. Again at Islington (as will be gathered from the report in our news columns), the Lighting Committee are likewise trying to pad the electricity undertaking's finances through the public lighting. The record of the electricity business in Islington, however, has not made it at all a general favourite; and the Lighting Committee are being refused a "walk-over." The electric lighting is pronounced an absolute failure, with one exception—it has not failed in increasing the compulsory disbursements of the ratepayers. It is an interesting reflection how frequently—and how the frequency grows!—evidence comes before us that the contact of municipal councillors with electric light undertakings appears to infuse into their natures an extraordinary amount of subtlety. There is an example here. It is a big scheme the Islington Lighting Committee desire to foist upon the ratepayers—comprehending 245 arc lamps, 15 miles of streets, and a capital cost of £21,011. And to what purpose? To show a "saving" of £16 on the present cost of gas lighting. But there is something behind this to which the Committee do not draw special notice. The total cost of the arc lighting is estimated by the Lighting Committee to be £2345 a year, which works out to about £9 10s. per lamp. The £2345 is a price, therefore, that cannot possibly embrace the capital charges on the large initial outlay of £21,011; so how can the Lighting Committee honestly say that the "saving" will be £16? It is not a considerable profit the Committee evidently want, but a supplement to the output of their plant; and the capital cost of getting it can be a burden on the ratepayers. What care the Committee? It is fortunate for the ratepayers that the Council contains some business men who are not to be trapped by the wiles of the electric lighting advocates. The Finance Committee have reported against the scheme; Crouch Hill has asked to be excluded from it; and before the Council will give any definite consideration to the proposal, the Lighting and Finance Committee are, as a Special Committee, to have a turn at its financial and other aspects. The capital account of the electric lighting undertaking has reached the substantial figure of £436,000; and the leisurely manner in which repayments are now being dealt with will, if continued, see the passing of sixty years before the present debt is extinguished. There will have to be an enforcement of a proper proportion being paid off every year in more Metropolitan electric lighting undertakings than one, or there will be a day of heavy reckoning. From the facts collected in this and the foregoing paragraphs, it must be admitted that the reputation of municipal electricity supply in London is not improving.

Turning from Metropolitan undertakings to an example of dissolute management of municipal finances in the Provinces, we have plenty of instruction of an eye-opening character in the accounts of the Brighton Corporation Electricity Department. Mr. H. Ross Hooper has a remarkable keenness for weaknesses in electric lighting accounts; and when he is the appointed Inspector, the electrical officials have anything but a light job to preserve their composure. The Brighton Corporation bear a bad character for unproductive lavishness in the spending of public money; but the most pronounced objectors to municipal trading could scarcely have anticipated the looseness existing in the keeping of the electricity accounts that Mr. Hooper brought to light in inquiring just recently into an application for an additional loan of £38,500 for the undertaking. Loans are granted for specific uses; but instead of keeping an account of the purposes for which the money has been expended so as to see how particular sanctions have been dealt with, the loans have been carried to a general capital account, and spent indiscriminately; so that there are no means of knowing precisely whether any of the money has been diverted from its designed channel. Mr. Hooper's comments on this condition of affairs were the contrary of complimentary; and before he finished with those representing the Corporation, he gave them to plainly understand that the sooner local authorities expurgated from their minds the erroneous notion that anything is good enough for the Local Government Board, the better it would be for them. The whole inquiry bristled with notable points, but we can only call attention to a very few. To use a commonplace remark, capital expenditure is going up by "leaps and bounds," but year by year recently there has been a falling off in new connections. We have always been compelled to recognize that correct estimating is not a strong point with electricians; and, on this subject of house connections, while last year the Electrical Engineer at Brighton was giving as his estimate £10 as the average cost of each connection, at this

inquiry he had to admit that it was an over-estimate, and that £6 10s. was his present view of the cost. The representative of a Committee of Ratepayers who were opposing gave between £3 and £4 as the cost in most other towns; while the Inspector mentioned applications that he had in mind where the cost was put at £2 17s. 6d. But at Brighton he said he could not get much definite information on anything. This was a mistake; a point that was most definite being the looseness of the department's methods of looking after their finances.

Instruction from this inquiry does not end there; but much that is informative is to be gleaned regarding electrical meters and motors. Both these appliances have a most unreasonable dislike to long life. The department have spent £37,878 on 9000 meters; but they have only 5000 in circulation. There is thus a balance of 4000 to be accounted for; and naturally the question was asked why the Corporation now wanted an additional £4000 for 1000 new meters. One thing led on to another; and it was gathered that a considerable number of these meters are now obsolete. But only £1000 has been written off; and although Mr. Arthur Wright had recommended that a further £1400 should be written off, this had not been done. In other words, these obsolete meters have been replaced without the debt attaching to them having been discharged. The 4000 meters not in circulation must have represented a capital outlay of close on £17,000. The Corporation in their wisdom say: "But it is as broad as it is long; if the money had been written off, it would not have appeared in the reserve account!" It is not as broad as it is long. The retention of the money in the reserve fund is another instance of the gross deception of the public. Then in regard to motors, we are constantly hearing from electricians of the profitable nature of the business to be obtained by fostering a day business by means of hiring out motors. The Brighton Corporation have spent £5142 on motors for hiring out. The income from them last year was £573, and £250 had to be spent to keep them in running order. This left a net income from them of £323 on a capital expenditure of £5142! The Local Government Board have evidently learned something about the depreciation of electric motors; for the period of fourteen years formerly allowed for the repayment of motor loans has been greatly reduced. The delinquencies of municipalities in connection with electric light undertakings are many; and they mostly have their origin in the anxiety of the managements to cover the unprofitable nature of the investment they have made in the name of the ratepayers. The result is that many of them in their perfidious acts go from bad to worse.

When electricians are doing their utmost to try to introduce electric cooking and heating among their consumers, with an imposing amount of difficulty in their path, it is convenient for them to forget that the time was when the contention was general that electric lamps gave off no heat, and could not possibly endanger their surroundings or produce fire. A fire and its cause at Littleburn Colliery supplied the subject-matter for a paper at the last meeting of the North of England Institute of Mining and Mechanical Engineers at Newcastle; and it included a number of experiments by the author (Mr. Holliday), showing the performance of an incandescent lamp when exposed to coal dust, to flannelette, chiffon, and cotton wool; and the temperatures were given in each instance at which the material ignited. The importance of the experiments in giving reliable information as to the danger of incandescent electric lamps was emphasized by Mr. Walker, Inspector of Mines, and Professor Bedson, of the Armstrong College. The peculiar inflammability of coal dust in the upper portion of mines—probably due to its absorption of oxygen—has been emphasized in a book, recounting some instructive experiments in mines, by Mr. J. B. Atkinson, Inspector of Mines, and his brother; and this invests with additional interest for those concerned in colliery work what happened at the Littleburn Colliery, and the account of Mr. Holliday's subsequent experiments. The discussion brought from one speaker an incident of how a fitter in his employ laid a lamp on a carriage seat, and burned a hole in it in much less time than ignition took in any of Mr. Holliday's experiments. Of course in this case there was direct contact; but where there is, as it were, an air-jacket surrounding the bulb, the danger is lessened.

COAL STATISTICS OF THE WORLD.

Production, Exports, Consumption, and Price.

It is possible now to supplement the figures regarding the output of coal in the United Kingdom during 1904 (which were given in the "Journal" for Oct. 31, p. 294) by some particulars of the production of other countries. These are obtainable from statistical tables, just published in the shape of a Board of Trade return, "relating to the production, consumption, and imports and exports of coal in the British Empire and principal foreign countries in each year from 1883 to 1904, as far as the particulars can be stated; together with statements showing the production of lignite and petroleum in the principal producing countries for a series of years." The general report accompanying the tables bears the signature of Mr. H. Llewellyn Smith; and perhaps the chief feature of the statistics on this occasion is the inclusion, for the first time, of figures relating to the consumption of coal in the principal British Colonies. In connection with the present tables, it may be called to mind that the Home Office Blue-Book already referred to showed that last year the total output of coal in the United Kingdom was the highest hitherto recorded. This fact it is interesting to bear in mind, in considering the relation of the British to the foreign and colonial production. It must also be pointed out that some of the figures relating to 1904 are provisional, and therefore subject to alteration; but having regard to the sources of the information, it seems fair to assume they are approximately correct.

The output last year of the five principal coal-producing countries of the world was as follows: United States, 314,563,000 tons; United Kingdom, 232,428,000 tons; Germany, 120,816,000 tons; France, 33,838,000 tons; and Belgium, 23,507,000 tons. In the case of Germany, as well as that of the United Kingdom, the output last year was greater than in any previous twelve months; but in France, Belgium, and the United States it did not reach the high figures of 1903. The total known coal production of the world—exclusive of brown coal or lignite—is now about 790 million tons (of 2240 lbs.) per annum. In Germany, France, and Belgium, of course, the metric ton of 2204 lbs. is used; but for this total the figures have been reduced to the same standard. Of the total amount named, the United Kingdom produces rather less, and the United States rather more, than one-third. In spite, however, of the larger total production of the United States, if the comparison is made on the basis of population, the United Kingdom is still ahead. Here the production amounts to nearly 5½ tons per head; while in the United States it is still under 4 tons. In Belgium the amount is under 3½ tons per head, in Germany about 2 tons, and in France under 1 ton.

Of the five countries referred to, the average value per ton of the coal produced, taken at the collieries, for the year 1903, was highest in France—11s. 3½d. per ton. Belgium comes next, with 10s. 4¾d.; then follow Germany 8s. 7½d., the United Kingdom 7s. 8d., the United States 6s. 7d. per ton. These prices represent a fall of about 7d. per ton in the United Kingdom, 3d. in Germany, and 5d. in France; but a rise of 3d. per ton in Belgium, and 11d. in the United States. The provisional figures available for 1904, it is stated, indicate a further fall of 6d. per ton in the United Kingdom, and 1d. in Germany; while in the United States there has also been a fall of about 8d. per ton. The average value of coal in this country in 1904 was less than in any year since 1898; but in the United States (where, of course, the output has enormously increased of recent years) the prices, though slightly lower in 1904 than in the preceding year, were still higher than in any other year since 1888. It is remarked in the report that, comparing the figures as between different countries, it should be borne in mind that many circumstances—such as the quality of the coal mined, improved machinery, nearness to the surface, the nature of the soil, &c.—affect the average value at the collieries, in addition to any difference there may be in the cost of labour.

Turning now to the production of coal in the principal British colonies and possessions, we find the figures given are for 1903; and the amounts are in every case stated in tons of 2240 lbs.—the quantities for Canada, Cape of Good Hope, and the Transvaal having been converted for this purpose. The following are the outputs, which in every case are greater than those for 1902: British India, 7,438,000 tons; Australian Commonwealth, 7,112,000 tons; New Zealand, 1,420,000 tons; Canada, 6,825,000 tons; Transvaal, 2,012,000 tons; Cape of Good Hope, 185,000 tons; Natal, 714,000 tons. Nearly the whole of the output of the Australian Commonwealth is, it is stated, produced in New South Wales. In 1903, the production per head of the population in Australia amounted to about 1¾ tons; in New Zealand it was the same; and in Canada it was about 1¼ tons. At the pit, the the average value per ton in the year mentioned was: British India, 3s. 6d.; Australian Commonwealth, 7s. 4d.; New Zealand, 10s. 9d.; Canada, 9s. 1d.; Transvaal, 8s. 9d.; Cape of Good Hope, 19s. 4d.; Natal, 11s. 9d. It will be seen that in no less than five out of seven of the places named the price was higher than the average for the same year in this country—7s. 8d. per ton.

The three largest coal exporting countries are the United Kingdom, Germany, and the United States; and in each case the figures for 1904 are the greatest recorded. In that year, the United Kingdom exported 65,822,000 tons; Germany, 21,631,000 tons; and the United States, 8,574,000 tons. The excess of exports over imports was: United Kingdom, 65,819,000 tons; Germany, 13,656,000 tons; and United States, 6,953,000 tons. These figures are, it is pointed out, interfered with to some extent by the fact that the published accounts do not in all cases show the procedure with regard to what is called "bunker coal." The exports from the United Kingdom include the coal shipped for the use of steamers engaged in the foreign trade; and in 1904 this amounted to 17,190,900 tons. In Germany and the United States, on the other hand, coal disposed of in this way is not included in the returns.

The total consumption of coal (arrived at by adding the imports to the home production, and deducting the exports) and the consumption per head of the population for 1904 are stated as follows: United States, 307,610,000 tons, or 3·76 tons per head; United Kingdom, 166,606,000 tons, or 3·89 tons per head; Germany, 107,160,000 tons, or 1·8 tons per head; France, 45,559,000 tons, or 1·16 tons per head; Russia, 22,953,000 tons, or 0·16 ton per head; and Belgium, 21,106,000 tons, or 2·98 tons per head.

From these figures it will be seen that the total consumption of coal in the United States is now nearly twice as great as that in any other country; while Belgium is the only country in which the consumption per head comes anywhere near that of the United Kingdom and the United States. It must, however, be borne in mind that the smallness of the consumption in France and Germany is owing to the fact that they employ a large quantity of fuel of other sorts—such as turf, wood, lignite, and denatured spirits. In the British colonies and possessions the consumption per head is highest in Canada; the figures for 1903 being as follows: Australian Commonwealth, 1·3 tons; New Zealand, 1·71 tons; Canada, 1·81 tons; Cape of Good Hope, 0·29 ton; Natal, 0·40 ton; and the Transvaal, 1·23 tons. So far as imports are concerned, the United Kingdom, Germany, and the United States are practically self-supporting. Only 3000 tons of coal were brought into this country in 1904; while Germany imported 7·5 per cent. of the consumption, and the United States about 0·5 per cent. The principal lignite producing countries are Germany, Austria, and Hungary; the 1904 output in Germany being 48,633,000 tons. The figures for the United States are included in those given for coal; but it may be mentioned that in 1903 (the latest year for which separate particulars are available) the production was 5,977,000 tons.

LOCAL ADMINISTRATION AND TAXATION.

The Thirty-Fourth Annual Report of the Local Government Board, containing particulars of the work of the Department for the year 1904-5, has lately been issued; and, as on previous occasions, we reproduce from it some of the statistics relating to local administration and taxation. The book is, as usual, a very bulky one; the report itself occupying 226 pages, and the appendices 745 pages more—making a total of nearly 1000. Yet this mass of matter does not record the whole of the Board's work; as a separate, and almost equally large, volume is devoted to the proceedings of the Medical Department. In the Blue-Book under notice, the various subjects are arranged, as in preceding reports, in five groups: (1) The work of County Councils under the Local Government Act, 1888; (2) proceedings under the Local Government Act, 1894; (3) the relief of the poor; (4) the public health and local administration; and (5) local taxation and valuation. It is with the statistics contained in the last two groups that our readers are specially concerned.

In the course of 1904, the Board issued fifty Provisional Orders under the Public Health Act, 1875, two under the Gas and Water Works Facilities Acts, 1870 and 1873, and eleven under the Local Government Act, 1888. Some of these Orders conferred additional powers on local authorities in regard to their gas and water undertakings, including the acquisition and use of additional lands, the supply of stoves, fittings, &c., the construction of works, the extension of the limits of supply, and other matters. An Order granted to the Congleton Corporation repealed certain provisions relative to the levying of lighting rates, and provided for the payment, out of the district fund and the general district rate, of the expenses incurred for the public lighting. New provisions were made in regard to the supply of stoves, fittings, and apparatus; and those bearing upon the application of the revenues of the gas undertaking were amended. Many of the Orders conferred additional borrowing powers. For the purposes of the gas undertaking, the Manchester Corporation were granted a sum of £1,000,000; the Tipton Urban District Council, £50,000; the Congleton Corporation, such sums as might be necessary; and the Glastonbury Corporation, the sum required for paying off the Gas Company's mortgage debt, which was transferred to the Corporation. For purposes of water supply, the Ashton-in-Makerfield Urban District Council were allowed to raise £5000; the Bolton Corporation, £125,000; and the Newton-in-Makerfield Urban District Council, such sums as might be necessary. It may be remembered that under section 62 of the Public Health Act, 1875, a District Council may apply to the Board to determine the reasonable cost at which water may be required to be furnished to houses without a proper supply; and the Board are empowered, by section 8 of the Public Health (Water) Act, 1878, to fix a general scale of charges for the whole or any part of a Council's district. Twelve of these scales were fixed last year for the Rural District Councils of Hayfield, Knaresborough, Lexden and Winstree, Macclesfield, Runcorn, Settle, and Wigan, in respect of certain contributory places.

In addition to the local inquiries conducted by the Engineering Inspectors of the Board with regard to applications made under the Local Government Acts of 1888 and 1894, and the Municipal Corporations Act, 1882, others were directed in 1013 cases. The majority of them related to applications from sanitary authorities for sanction to the borrowing of money for carrying out works under the provisions of the Public Health Act, 1875, the Electric Lighting Act, 1882, the Public Health (London) Act, 1891, and others. Among various matters calling for inquiry were certain objections raised to the laying of water-mains beyond the limits of the districts of the applicants for the loan. During the year, the Board gave their consent to proceedings being taken against many manufacturers for the pollution of rivers and streams. The approval of the Board in regard to matters within their jurisdiction was given, under section 4 of the Borough Funds Act, 1872, to the resolutions of 19 County Councils to oppose 48 Bills in Parliament. No application was made for sanction to the promotion of a Bill. The Board made reports to Parliament on 108 Private Bills, of which 49 were promoted by local bodies and 59 by companies or other authorities. In eleven cases it was found necessary to present supplementary reports, in consequence of alterations made in Bills while passing through Parliament. In an appendix to the report is a list of the Acts obtained during the year 1904 by local authorities and by gas and water companies in England and Wales, exclusive of the Metropolis.

Turning to financial matters, the report records that the Board sanctioned in the period dealt with the borrowing of £10,291,733 by urban and rural authorities, compared with £11,047,629 and £11,466,647 in the two preceding years. The former authorities required £718,658 for water supply and £1,849,742 for sewerage and sewage disposal, and the latter £159,585 and £538,453 respectively; while the Joint Boards needed £741,044 (inclusive of £564,690 sanctioned to the Metropolitan Water Board), and £26,395 for carrying out works for the purposes named. Since the constitution of the Local Government Board in 1871, they have sanctioned the raising of no less than £159,088,901. They began with £267,562, and increased to £13,291,828 in 1901-2. Since then there has been a gradual falling off—the amounts being £11,466,647, £11,047,629, and £10,291,733. During the past 35 years, Parliament has conferred upon local authorities borrowing powers to the extent of £140,506,132 without departmental sanction. Detailed information with respect to all the loans authorized by the Board during the past year—their purpose, the authorities by whom they were to be raised, and the number of years allowed for their repayment—is, as usual, furnished in tabular form in one of the appendices. Under the Public Health Act, 1875, the Board recommended the Public Works Loan Commissioners to make advances amounting to £142,276 to local authorities. Of this total, £80,760 was required by town and urban district councils, and £61,516 by rural district councils.

The accounts of the Councils of the Metropolitan Boroughs and their officers were completed for the year to March 31, 1904, as well as the first audit of those of the Metropolitan Water Board and their officers, under the Metropolis Water Act, 1902. The accounts of 813 urban district councils were examined by the district auditors, as were also those of 672 rural district councils, 109 joint boards for sanitary purposes, and 242 joint committees appointed wholly or in part by district councils. In the year ending Dec. 31, 1904, the auditors reported 102 disallowances and surcharges in the accounts of town councils, 481 and 343 in those of urban and rural district councils, 37 in those of joint boards for sanitary purposes, and 13 in those of special gas and water authorities. Many of these were appealed against; and the Board decided 21 in the first group, 95 in the second, 12 in the third, and 4 in the fourth. The accounts of 6453 parish councils, 409 meetings for parishes not having councils, and 102 joint committees of these authorities, were also investigated by the district auditors; the audit in each case including the accounts of the officers of the local authority. The Board received altogether 185 disallowances and surcharges; and they decided appeals in respect of 40 of them. Reports were made of the disallowance or surcharge of 37 sums in the accounts of the Metropolitan Borough Councils and their officers; and 18 appeals relating to them were decided. Particulars of all the appeals, and of the Board's decisions thereon, are given in an appendix.

The section of the report which deals with local taxation and valuation is always a very instructive one. We learn from it that the Board prepared and presented to Parliament in the session of 1904 returns showing, for the financial year 1902-3, particulars of the receipts, expenditure, and outstanding loans of the various local and other authorities in England and Wales. These returns summarize the accounts of 28,100 local authorities. An epitome of the statistics given in one of the appendices shows that the aggregate receipts, inclusive of £35,271,367 received from loans, amounted to £129,206,784; and the aggregate expenditure, including £36,086,198 defrayed out of loans, came to £128,968,743. The receipts included £7,168,705 from gas-rentals, £4,184,611 from water-rates, and £1,881,265 from the supply of electricity. Of the grand total, 39 per cent. was derived from public rates; 9·9 per cent. from local taxation duties, Government grants, and other receipts from Imperial funds; 13·2 per cent. from revenue produced by gas, electricity, water, and tramways undertakings; and 27·3 per cent. was borrowed. Of the aggregate expenditure, £20,287,264, or 15·7 per cent., was devoted to the repayment of borrowed moneys and of interest thereon. Other large items of expenditure were the following: Gas-works, £6,336,750; electric lighting, £5,375,984; and water-works, £6,030,034—being respectively 4·9, 4·2, and 4·7 per cent. of the total expenditure. The outstanding loans of the local authorities at the close of the year under notice amounted to £370,607,493, of which £23,110,919 had been obtained for gas, £18,550,120 for electric lighting, and £63,130,859 for water supply; the amounts raised for these purposes in the twelve months being £1,214,086, £4,034,294, and £4,959,083.

A very interesting table is the one showing, for the financial year 1874-5, every fifth succeeding year to 1899-1900, and each of the next three years, the total amounts received from public rates, from Imperial taxation, from loans, and from other sources,

The first-named year, the receipts from rates came to £19,198,579; in 1879-80, they were £22,021,601; and in 1889-90, £27,713,409. For the next three years the figures were £42,993,668, £46,438,764, and £50,328,412. So that in the period named the total went up £31,129,833, or 162·1 per cent. During the same time the sums received by the various local authorities out of the proceeds of Imperial taxation (including those paid to them out of the local taxation account) rose from £1,681,399 to £12,786,707; being an increase of £11,105,308, or 660·5 per cent. Excluding £1,328,019 received under the Agricultural Rates Act, 1896, there is an increase of £9,777,289, or 581·5 per cent. The amount annually raised by means of loans has of late years increased very rapidly; the amount obtained in this way during the year 1903-4 being greater than in any preceding similar financial period. The other receipts—derived from gas and water works, electricity supply, markets, tramways, &c.—rose from £9,938,666 in 1874-5 to £30,820,298 in 1902-3; being an increase of 210·1 per cent. The total receipts of the local authorities of England and Wales in the year 1902-3 were more than three times as great as the corresponding total for 1874-5. Attention is directed to a table in an appendix showing that the amount of rates raised to meet the expenditure of School Boards went up from £1,484,312 in 1879-80 to £6,744,173 in 1902-3. This table also shows that in the interval named the amount of rates entered in the returns as raised to meet the expenditure of town councils and other urban sanitary authorities increased from £5,778,155 to £17,574,794—that is to say, by £11,796,639, or 204·2 per cent. This is equivalent to 41·7 per cent. of the total increase of £28,306,811 which took place in the rates of all classes of local authorities. The average amount of public rates raised per head of population in 1879-80 was 17s. 4d.; in 1902-3, it was 30s. 6d. The outstanding loans averaged £5 7s. 11d. per head in the former year; while for the latter the figure was £11 4s. 8d. The proportion which the amount of the outstanding loans of local authorities bears to the population and rateable value of the several areas in respect of which the loans were incurred varies greatly in different localities. It is generally greatest in those in which gas and water works, electric light undertakings, and tramways are owned by local authorities instead of by companies.

It may not be altogether without interest to close this notice of the report with a comparison of the figures of the outstanding loans of the local authorities in England and Wales with the National Debt of the United Kingdom. At the end of the year 1874-5, the latter amounted to £767,268,559; and the former to £92,820,100, or 12·10 per cent. In 1902-3, the figures were £798,349,190 and £370,607,493; the latter being 46·42 per cent. of the former. So that while the National Debt increased in the interval by £31,080,631, the loans of local authorities augmented by £277,787,393. The loans raised by these bodies during the 28 years amounted approximately to £407,597,255.

THE PROPOSED AMALGAMATION OF AMERICAN GAS ASSOCIATIONS.

At the Meeting of the American Gaslight Association held at St. Louis last year, a Committee was appointed to draw up a plan providing for a single Gas Association, to be composed of the men engaged in the gas industry in North America, and submit it to the existing Association for ratification. The Committee, which was a thoroughly representative one, duly deliberated upon the subject referred to them, and presented their report (which was signed by Mr. F. H. Shelton, the Chairman) at the annual meeting of the Association at Milwaukee last October, as already mentioned in the "Journal." After briefly reciting the circumstances in which they were constituted, and giving the names of the members and of the Associations they represented, they submitted the following recommendations.

That there shall be a union of the American, the Ohio, and the Western Gas Associations into a single National Association, and that the combined Association formed by this union be called the "American Gas Institute."

That the first governing body of the Institute be composed of the then Presidents, Vice-Presidents, and Secretaries of the three Associations, and that this governing body nominate, either of itself or through a nominating Committee, officers for the Institute, to be voted on at the first meeting, and that the Chairman, who presides over the first meeting of the Institute until the permanent organization has been effected, shall be chosen by lot from the then Presidents of the three Associations.

That the membership of the Institute be composed of four classes—Honorary, Active, Junior, and Associate—the qualifications to be met by the members in each class to be specified in the proposed constitution.

That each of the Associations which are to dissolve as separate bodies and unite to form the Institute, shall prepare lists of their members in good standing at the time the Institute is formed, classifying these members according to the qualifications set forth in the proposed constitution; the lists so prepared to be accepted by the Directors of the Institute, qualifying each person whose name appears on them as a member, in the class under which his name is listed, without having to be elected or pay any initiation fee or dues for the then current year. Provided that, in order to have his name placed on the roll of members of the Institute, each of the persons whose name appears on the above-mentioned lists must make application to this effect in writing to the Directors of the Institute within 60 days after notice has been sent him of the formation of the Institute.

That the Institute offer inducements to the District or State Gas Associations then existing or thereafter to be formed to co-operate with it, conditional on each Association confining its elections to membership thereafter to persons directly identified with gas interests in the district whose name it bears, and on their agreeing on their part to consult with the Institute before undertaking any original work, and to do each year a certain amount of original work in co-operation with the Institute. That the Institute agrees that each such Association shall have the right to elect one Director of the Institute; the total number of Directors to be so regulated that the Institute itself shall at all times elect at least two-thirds of this total; and that the immediate conduct of the affairs of the Institute shall be in the hands of an Executive Committee elected by the Directors, which shall include, in its membership of ten, one man from each of the co-operating Associations, as long as the number of such Associations does not exceed six, and that when this number is exceeded there shall be on the Executive Committee at least six men who are members of co-operating Associations, and have among them membership in at least six such Associations.

[A proposed constitution, drawn up in accordance with these recommendations, was submitted as part of the report.]

In order that the plan of amalgamation set forth in this report may be put into effect, the Committee recommends that the governing bodies of the American, Ohio, and Western Associations, with the approval of their respective Associations, appoint each an Organization Committee, with full powers to take part in the organization in accordance with the recommendations mentioned above, of an Association to be known as the "American Gas Institute," and to this end to wind up the affairs of, and to dissolve, the organizations they represent. And it also recommends that each governing body shall instruct its Organization Committee that it is to proceed to effect the organization of the proposed American Gas Institute, and the winding up and dissolution of the existing organization, if such action be taken by two or all of the Associations above-mentioned.

The President (Mr. E. G. Cowdery) having invited the members to express their views on the subject before them, Mr. W. R. Beal moved that the Council of the Association be authorized and instructed to take such measures as might be necessary to organize a Gas Institute on the lines laid down in the report; and Mr. C. J. Russell Humphreys seconded the motion. Mr. Shelton, as Chairman of the Committee, asked, before the motion was put, and in order that it might be more intelligently voted upon, to be allowed to make a few remarks. He then spoke at some length on the advantages of amalgamation, and indicated several directions in which the Associations could, in his opinion, do better work if they were united. He concluded by reminding the members that the proposal before them had been studied by the best class of men in the business earnestly and conscientiously for the last eighteen months, and submitted that the present was a golden opportunity for the American Associations to show their breadth of view and disposition to get together on such a platform as had been suggested. Mr. H. L. Doherty followed with a few observations, in the course of which he said he had presented to the Committee a plan which he believed to be a proper one, but it was considered too elaborate; and consequently his was the only negative vote in the closing proceedings. However, he merely wanted to see Association work in the gas business organized so that it promised the greatest progress to the business and to the men engaged in it. He felt that the time had come when they should bury their little differences. The report had passed the Committee and also the Council of the Association, after careful consideration, with one dissentient vote. He gave it, and he now withdrew it, and tendered his hearty support to the plan. He was willing to work for its success, and he thought every man interested in the progress of the gas industry should do likewise. The motion was then put and carried unanimously.

CEMENT JOINTS FOR GAS-MAINS.

At the last Meeting of the Western (U.S.A.) Gas Association, Mr J. D. von Maur, of St. Louis, read a paper on the above subject. It was published in the "Journal" for the 18th of July (p. 178), and the remarks to which it gave rise were noticed in a subsequent issue. A further contribution to the subject was made in a recent issue of the "American Gaslight Journal" by Mr. W. Musgrave Wood, who has been using cement joints exclusively in some districts, and, unlike certain engineers whose experience had been recorded in an article in a preceding issue of our contemporary, has found them perfectly satisfactory. His communication is as follows.

If the cement joint is properly made and carefully treated, until finally filled in, there is practically no chance of a resultant leak. As little yarn and as much cement should be used as possible, for the yarn materially weakens the joint. The tightness of the joint depends upon its ability to withstand the effect of strains caused by the changes of temperature. In order to determine about

what was the variation of temperature at 3 feet below the surface at the latitude of Philadelphia, numbers of recording thermometers were buried at different depths; and the maximum summer and minimum winter readings gave an average variation of slightly less than 50° Fahr. for a 3-feet depth. This change will cause the pipe to contract or expand 0·04 inch for every 12-feet length of pipe; the coefficient of expansion for cast iron being 0·000000556, according to "Kent." The cement joint being absolutely rigid, will not allow for this contraction, and consequently has to stand the strain necessary to stretch the length of pipe the same amount.

Referring to "Kent" again, I find the modulus of elasticity of cast iron, for about 4000 lbs. per square inch, is 15,000,000; therefore the force to counteract 50° variation of temperature is 4170 lbs. per square inch. From this, I have deduced the following table:—

Size of Main.	Thickness of Wall.	Sectional Area of Pipe.	Total Force Required to Stretch Pipe.	Depth of Cement Joint.	Area of Cement, Longitudinal.	Shearing Force per Sq. In. of Cement.
In.	In.	Sq. In.	Lbs.	In.		
6	½	10	41·700	3	66·0	632
12	¾	25	104·250	3	124·5	837
16	⅞	33	137·610	3¼	175·5	784
20	1	49	204·330	3¼	209·6	975
30	1¼	85	344·450	3½	350·0	984

I have been unable to get any figures on the tensile strength of cement joints. The only case I know of was a 6-inch joint which was weighted with 8000 lbs. without having any effect upon it.

"Kent" gives the compressive strength of cement at—

10 days	. . . . .	2910 lbs.	per	square inch.
20 ,,	. . . . .	3342 ,,	,,	,,
30 ,,	. . . . .	3721 ,,	,,	,,

The tensile strength being—

10 days	. . . . .	376 lbs.	per	square inch.
20 ,,	. . . . .	420 ,,	,,	,,
30 ,,	. . . . .	451 ,,	,,	,,

From the nature of a joint with the bead and lead groove, it is quite evident that the tensile strength of a cement joint is much nearer the compressive than the tensile strength of cement as given above; therefore, after the joint has once had a chance to set properly, there is little likelihood of it leaking from outside disturbances.

Our chief difficulty has been with large joints. Any size below 16 inches diameter is made up and allowed to set overnight, and when tested we never expect to find any trouble; but with 16, 20, and 30 inch pipe, it requires considerable care to make the joints hold the 3-lbs. test which we place upon them after 24 hours' setting. The following are the reasons for leaks occurring upon new work: (1) Badly mixed cement; (2) Settlement of blocking; (3) Poor driving on the second strand; and (4) Variation in temperature.

The cement should be mixed just as stiff as the men can work it; about four parts of cement and one part water by volume. It should be thoroughly mixed, and only one joint full at a time. The blocking under the pipe should be ample. Our practice is to use two 3 inch by 12 inch by 12 inch spruce blocks under each 6-inch length, and four 4 inch by 12 inch by 30 inch spruce blocks under a 30-inch pipe, with gradual variation for intermediate sizes. The blocks should be placed upon an even original bottom, and settled in place with a rammer. As the second strand of yarn is the keystone of the joint, it should be driven back into place, the harder the better, making a very intimate contact between the cement and the iron, and also driving out all air bubbles.

Last, but most important, is the question of temperature. The pipe should be kept as near an even temperature as possible. In order to accomplish this, we place boards over the ditch at about 2 a.m., when the pipe is coldest. The joints are then made up between 5 a.m. and 8 a.m., uncovering each joint just long enough to make it up. After replacing the boards, about 6 inches of dirt is placed upon them; and as long as the sun is shining in the ditch, the dirt is kept sprinkled with water. At no time is the sun allowed to strike the pipe after the joint is made. Even the final filling is done early or late in the day.

In comparing the costs of lead and cement joints, I have very little data, except for 16-inch pipe. Taking the average of a day's work on cement joints, I found that the labour, at 22½ c. an hour, cost 17 c. per joint; while when making up lead joints the cost was 38 c. per joint, including all the labour. The material required to make a 16-inch cement joint is 0·73 lb. of yarn and 3·07 quarts of cement; while lead joints require 32 lbs. of lead and 1·56 lbs. of yarn. Cement at $4·50 per barrel will cost 4 c. per quart; yarn is worth 3·9 c. per pound; and lead 5 c. per pound. These give the comparative costs as follows, for 16-inch pipe:—

Lead Joint.		Cement Joint.	
Labour	$0·380	Labour	$0·170
Yarn	0·061	Yarn	0·029
Lead	1·600	Cement	0·122
	2·041		0·321

METHODS OF CHARGING FOR GAS.

Remarks on Mr. Forstall's Paper.

In the "JOURNAL" for the 21st ult. (p. 538), we gave a paper read at the annual meeting of the American Gaslight Association, by Mr. A. E. Forstall, of New York, in which he laid before the members his views on the subject of charging for gas. The author's proposals, it may be remembered, were criticized by Mr. T. Newbigging at the meeting of the Manchester District Institution of Gas Engineers the following Saturday; and therefore it may be of interest to show how Mr. Forstall's scheme was received by his colleagues. This we are able to do from the report of the discussion in the "American Gaslight Journal."

Mr. F. W. FRUEAUFF, the Vice-President and General Manager of the Denver (Col.) Gas and Electric Light Company, was the first speaker. He said that Mr. Forstall had mentioned the "maximum-demand" charge as the principal difference between the methods advocated by him and those referred to in the paper read by the speaker last year; but he (Mr. Frueauff) thought it might be kept in mind that, in addition to the so-called maximum demand, other expenses which should be considered were those capacity charges which were fixed largely by the general plan of taking on business—such as executive salaries, taxes, legal expenses, &c. He thought Mr. Forstall had made a serious mistake in stating that since maximum-demand and consumers' charges are not based upon actual costs, they are just as inequitable, and therefore, in the long run, just as bad policy, as a similar un-uniform charge per 1000 cubic feet. The consumers' and capacity charges referred to followed the lines of cost; but it should be apparent that they must necessarily carry a profit, because the company must still continue to sell to some consumers at a loss, which must be made up from the profitable consumers. He could not see why it was necessary that such charges should be based on actual cost, while those for gas used might show a profit. The company were legitimately entitled to a profit on all classes; and therefore there must be greater equity to the large user in paying these charges, based on cost, even though they carried with them a profit, than paying a uniform rate per 1000 cubic feet, which must disregard cost when applied to his particular case. He declined to go over the items that Mr. Forstall thought were embraced under the demand, and called attention to the omission of the various fixed expenses at the works, which, he said, did not increase or decrease with the output of gas. The general expenses of the company, largely based on the size of the concern, should be proportioned among the consumers according to their demand rather than their consumption. He did not agree with Mr. Forstall that "such a course would not conform to the requirements that no greater profit be made off one consumer than that made off another when the same service was rendered to each." He (the speaker) knew of one company who had adopted a price from an analysis of consumers who a year ago were supplied under a straight meter rate, and who this year were buying under the "readiness to serve" rate, who showed an increase of 40·2 per cent. in sales, and of 14 per cent. in income. In addition, much desirable business had been obtained from new users that it was found impossible to secure under the straight meter rates.

Mr. R. C. DAWES, the President and Treasurer of the North-Western Gaslight and Coke Company, said Mr. Forstall had reminded them that the arguments against the equity of the traditional horizontal gas-rates had not been controverted; and he presented an alternative system of charges tacitly admitted by them all to be scientific and equitable, even though cumbersome. Mr. Frueauff's paper and Mr. Forstall's presentment left little to be said. They understood the proposed system, recognized its justice, and realized the unevenness of the present system of charges. The inactivity to remedy the existing methods was hardly explainable except on the ground of littleness; or was it that they shrank from a change of rates, which to maintain the old average would necessitate an increase of charges against 70 per cent. and a decrease against only 30 per cent. of their customers? He thought each of them must feel that something should be said in defence of a system entrenched behind a century of use. What he purposed saying was largely tentative, and had not even the merit of being the expression of a profound conviction. The strong arguments adduced left him in some doubt; but had the members heretofore, in their discussion of the question, given sufficient weight to the possible demands of the public they served? Most gas companies operated under franchises, which, of course, were contracts between the public and the company. Probably an essential consideration of these contracts was deemed by the public to be the equality of charges, regardless of the quantity of the commodity purchased. Probably never before the last four years had it been made so clear to them why it cost more to supply small consumers than large ones, and exactly how much more it cost. But it was wrong to assume that men did not always know the general fact. Horizontal rates were never considered equitable and scientific in themselves, but the public had written them into the franchises. The use of the streets, according to their theory, was a privilege in the granting of which every citizen, whether he was likely to be a large or a small consumer,

had shared; and having shared equally in giving, each one had hitherto demanded that he should share in perfect equality of rates. If he (Mr. Dawes) were able to judge the feeling of the public to-day, they would continue to demand it. They were not likely to take kindly to the idea that a large consumer of gas should pay less per 1000 cubic feet than a small one. He was aware that, under the proposed system, the rate per 1000 cubic feet was the same to all, and that the adjustment was to be made by investment charges, readiness-to-serve charges, and so forth; but this might possibly increase, not pacify, their resentment. To use Mr. Forstall's example, the fact that a customer using 1000 cubic feet of gas paid $5 per 1000 feet, and one using 20,000 cubic feet paid $1·75 per 1000, might, after all said and done, leave some part of the public irritable. It might be a fair rate, and the profit might be the same to the company in each case; but if the public chose to do so, it was also fair for them to give up the use of the streets on the condition of equality of rates. Any change in gas-rates which would appear on analysis to be discriminatory against the small consumer, would, he feared, particularly at this time, be objectionable to the public. He said this without forgetting that the present rates were in a sense discriminatory against the large consumer; but the companies were not responsible for it. They were under the bond of tradition, if not of contract, to make their rates uniform; and just now public feeling was not particularly sensitive about the large consumer. The small consumers out-voted him and out-talked him. He did not wish to underrate the value of the suggestions made by Mr. Frueauff and Mr. Forstall. Their arguments were, of course, beyond cavil; but they had to serve the public, and gas managers must be in harmony with them. If, in the years to come, an educated public opinion demanded, or even admitted, a scientific and equitable rate, he believed these men had established the basis of that rate; but it was his present opinion that the public inclined to prefer the horizontal rate, for the reason which had always prompted them to prefer it—which, by the way, was the very reason for the advocates of the new system condemning it—namely, because it discriminated in favour of the small consumer. He even thought they always would prefer this sort of rate; and if they did they would have it, for this question was not one to be solved by a legal analysis of the terms of a franchise, or by expert calculation of the cost of production, but one which would eventually be decided from the point of view of the consumer. The consumer had been dealing with gas companies for decades. He had ideas in reference to them which might not easily be supplanted. These ideas led with unwavering directness to the theory that there must be no discrimination in rates based upon the quantity of consumption. Perhaps they were wrong; but wrong ideas which had become deep-rooted ones were not easily eradicated, even when they did not entail any personal hardship. When the inevitable result of the proposed change would be the imposition of an additional burden upon the large majority for the apparent benefit of the small minority, the task became almost impossible.

Mr. H. L. Rice, of Aurora (Ill.), the Assistant-Manager of the Fox River Light, Heat, and Power Company, said his understanding of Mr. Forstall's argument was that he sought to make his maximum-demand charge absolutely equal for all consumers; and in obtaining this, he arranged certain demand charges among all consumers. He (the speaker) had in his mind a town where more than 50 per cent. of the entire consumption was delivered in an hour—from 11.30 a.m. to 12.30 p.m.—and perhaps 80 per cent. of the consumers participated therein; but the remaining 20 per cent. took no part in the general maximum demand, their highest demand being below the average. Following Mr. Forstall's classification, the 20 per cent., therefore, were not a tax on the plant or the mains. The argument of equity to all would certainly not apply where consumers were made to share in such terms.

Mr. Paul Doty, the Vice-President and General Manager of the St. Paul (Minn.) Gas Company, asked Mr. Forstall how, in making up his statement of profit, he took care that there should be a profit on the average demand. As he (the speaker) understood, Mr. Forstall made the maximum demand excess maximum demand, and provided for receiving a revenue thereon. He thought in several cases Mr. Forstall omitted the word "excess." For instance, he said: "Summing up the various charges as determined above, we have for the total maximum-demand charge per year for a consumer with a demand of 80 cubic feet per hour $4·86." He believed the argument was based on the excess for 80 feet. Again: "If this charge varied in exact proportion with the variation in the greatest demand, it would make a charge of about $6 for a maximum of 100 cubic feet per hour." Did this mean "excess" maximum demand? If not, the charge for 100 cubic feet maximum actual demand per hour would mean a capitalization very much less than it was possible to deliver gas for and pay the investment charges. For example, if the hourly demand was 100 cubic feet, and this represented 1-1600th of the yearly demand, it would make the annual consumption 160,000 cubic feet; and an investment of $6 for an output of 160,000 cubic feet per annum would make a capital charge of 37·5 c.

Mr. Forstall said he failed to see how a charge of $6 a year could make a capital charge of 37·5 c.

Mr. Doty replied that 100 cubic feet per hour, multiplied by 1600 (the figure given as representing the yearly output) times the hourly demand, equalled 160,000; and 160,000 into $6 (a charge of $6 per 1000 for maximum demand) would make a capital charge of $160,000, or 37·5 c. per 1000 feet. They knew they could not invest capital on the basis of 37·5 c. per 1000 cubic feet, and they further knew that the figure was higher.

Mr. L. G. Van Ness said in Mr. Frueauff's paper read last year one could see that the calculation carried interest in the fixed charge to the customer; but in Mr. Forstall's calculation, most of the interest charges and profit were taken care of by the charge per 1000 cubic feet to the consumer. He would like to call attention to this matter of profit and interest. They always allowed the "per 1000 charge to take care of the profit;" but there was really very little difference between the profit or the dividends on the investment and interest charges. It was simply a difference as to the way in which a company was organized. If they had all stock, and paid dividends on this stock, it appeared as a profit charge. If they had bonds and stock, the stock being of very little value, the interest on the bonds was the profit which replaced it. Therefore it was perfectly proper to have the profit on the gas and also the interest on the investment carried by the rate per 1000 cubic feet. Mr. Forstall went one step farther in the calculation, by allowing the interest on the investment for the equipment for the average supply of gas; and he allowed this charge to go into the fixed charge to the consumers. He thought they could with equity allow all the interest charges to be carried by the price to the consumers. If they eliminated this from Mr. Forstall's figures, very little was left for the demand charge. Among the items making up the $4·86, there were one or two purely of maintenance account. The rest related to interest and depreciation; and he thought all would agree with him that they could consider depreciation in the same light as maintenance. Therefore, if they separated these into maintenance and interest, and transferred the interest charge to the rate per 1000 feet, their fixed charge per consumer, or per 1000 cubic feet demand, would come still lower than Mr. Forstall had suggested. He thought Mr. Forstall was justified in transferring the interest on the average equipment to the charge per 1000 feet; and he also thought they could go a step further, and, in reducing these fixed charges to a very small amount, they would find fewer of the consumers figuring as an actual loss to them than they had been led to believe by previous calculations. He called attention to one other item he thought was lost sight of. There was the promoter of business; and they all knew that he was irrepressible. If they fixed a charge on each consumer before rendering him a bill for the gas per 1000 cubic feet, the promoter would certainly absorb that "fixed charge" if it were going to prevent him getting the poorer classes of people to begin burning gas. If he "absorbed," they would charge it back to him in his department; and it appeared in the rate per 1000 feet according to Mr. Forstall's classification. It was simply a transference from one pocket to another. The largest proportion of fixed charges that could possibly be looked for in the gas business was 30 per cent. If they recognized Mr. Forstall's step as being a proper one, the total fixed charge would be something less than 15 per cent. Then the question arose as to whether or not this was large enough for them to take account of, considering the fact that they handicapped the promoter of new business if they were to adopt that rate universally. He (the speaker) thought the number of consumers who were a loss to a company depended entirely on the judgment of the man making the analysis as to how much of the expense should be considered a fixed charge, not proportional to output. It would pay them to study the situation carefully, so as to make sure that they had nothing in the demand charge that could be taken care of justifiably by the current charge per 1000 cubic feet.

The Secretary (Mr. G. G. Ramsdell) read the following contribution to the discussion from Mr. Chas. D. Robinson, of Auburn (N.Y.): It seems the height of presumption for one of my limited experience to doubt the advisability of a measure that has had the active support of such men as those who have advocated this method of charging; but, after considerable study of the subject, there appear to me to be some strong arguments against its general adoption. There are two causes for reduction in price—namely, the desire to increase our output and public sentiment. Examining this method with the first cause in mind, and taking Mr. Frueauff's statement that the consumers' charge should be approximately $12, the maximum-demand charge $15 per 1000, with gas at 60 c. in a city where the average price is $1·10, and that the system should be made optional, we find that, under average conditions of consumption, only such consumers as burn more than 40,000 cubic feet annually would be benefited. This would be 20 per cent. of the consumers of the average gas company. The remainder would still be paying $1·10 per 1000 cubic feet. Assuming that within the next ten years this company could reduce their price to $1 to all consumers, but that instead of doing so they allowed the same amount of reduction to the 20 per cent. of the consumers using upwards of 40,000 cubic feet of gas per annum, and representing 50 per cent. of the company's annual output, this 20 per cent. would have an average rate of 90 c., while 80 per cent. were still paying $1·10. What does this average 90-c. rate amount to from a competitive standpoint? It is derived from the factors $12, $15, and $0·60. This is not low enough to compete with steam-engines of over 40-horse power, or with crude oil for brazing, forging, &c., and gives a lower rate than is necessary to laundries, canning factories, &c., where the only available competitor is gasoline. A third of our total consumers are wage-earners, whose average

rate would be about $1·80 per 1000 cubic feet. If this rate should be made compulsory, you would actively antagonize 50 per cent. of your franchise givers. If you make it optional, and allow the contemplated reduction to your profitable consumers only, your published rate must remain high as compared with neighbouring cities giving flat-rate reductions, and 80 per cent. of your consumers will be antagonized; and if such a flat-rate reduction should be compelled, a company would be in bad shape if 50 per cent. of the output were contracted for at less than the established rate. I have used Mr. Frueauff's figures instead of those given by Mr. Forstall, because, his being a more extreme position, my argument can be made plainer and stronger. But that advanced against his figures applies to those suggested by Mr. Forstall, but with less force; and as in some States the proposed rate would be illegal, the number affected would be so small that it would hardly pay to apply it. This rate can be of great use in determining at what price new business can be taken on at a profit. By its use it is easy to demonstrate that a 25-horse power gas-engine, using 1,200,000 cubic feet of gas per year, at 50 c. per 1000 feet, is a more profitable consumer than a factory-lighting load with a 2500 cubic feet maximum hourly demand, using 600,000 cubic feet of gas per year at $1·10. Its calling our attention to the fact that some of our business is unprofitable is a valuable feature; and by its nominal adoption, at the option of the consumer, this rate enables the manager to make special rates without being laid open to the charge of discrimination, as the amount of fixed charge is entirely in his hands. But I do not believe it will ever be good policy as a universal rate. My idea of a gas-rate is a flat rate as low as the conditions of the business will warrant and public opinion demand, and special rates to special users; that a very low rate must and can be made; while in competition with gasoline such a low rate is not necessary, and the gas companies should have this profit to enable them to carry their less profitable business. I do not believe that a uniform Doherty rate on an optional basis will ever enable gas companies to make a rate that will meet competition in all fields that they can legitimately enter by special rates. A careful analysis of the books of the company with which I am connected shows that only one-third of the consumers would get this reduction, or 7 per cent. of the whole need it. The remainder are those who use gas in business places, when whatever it costs is part of the expense of conducting the business, and is not felt as a hardship. In the matter of public sentiment, I cannot see that this rate helps us in the least. In investigating this matter for a company that had decided that it must realize $1·15 on all gas sold, and expected to put in force a $1·35 rate, with special prices for special uses, I had our consumers divided into the following classes: A, offices; B, wage-earners; C, capitalists, professional men, &c.; D, factories, places of business, &c. Using Mr. Frueauff's figures, compared with a $1·35 rate, I found as follows:—

	Increase. Per Cent.	Unchanged. Per Cent.	Decrease. Per Cent.
Class A	5	..	..
,, B	30	5	17
,, C	11	2	15
,, D	4	..	11
	50	7	43

This table shows that if the Doherty rate could be universally applied, 43 per cent. of our consumers would be benefited at the expense of 50 per cent., and that more than half of those benefited will allow us to compete with other fuels whenever it can be done at a profit, as shown by the Doherty system.

Mr. A. P. Lathrop, of Detroit (Mich.) thought that all who had made any analyses of their accounts realized the fact that a large percentage of their customers not only brought no profit, but caused absolute loss. There was no question but that a rating system where each customer paid his maintenance cost, would be ideal if it could be universally applied, for in that case they would either rid themselves of their present small customers, or else obtain a fair revenue from them; and they would be able to so lower the price of gas that they could encourage a class of business which at present prices they were unable to reach at all. He always felt that the system mentioned required so much explanation and education, that its universally attempted adoption would result in more harm than good; and he further thought that a system of rating based on quantity, with a minimum monthly charge which would prevent customers from demanding an installation they did not intend to use, would work much to their good in the end. But assuming that the "readiness to serve" system, so called, could be applied, he thought Mr. Forstall put his costs too low. If a gas plant could be located wherever one wished to place it, and the customers would arrange their homes and places of business convenient thereto, they might get along with a system of 3-inch pipes, provided the output was absolutely uniform; but in consequence of having to locate plants in one section of the city and deliver the gas at very remote sections, it would hardly seem possible that a basis of a 3-inch pipe was a fair one to start from. With the exception of meters, Mr. Forstall assumed that 10 per cent. was sufficient to cover interest and depreciation, which, assuming they were entitled to 6 per cent. on the investment, would only leave 4 per cent. for depreciation, which appeared altogether too small. Mr. Forstall thought no profit should be made on the demand and consumers' charge; but he (the speaker) saw no reason why they should be compelled to make these heavy investments without expecting any return other than ordinary interest. It frequently happened that much of this investment was out of use for long periods of time. An objection to this system of rates was that it was based on an idea that all customers must contract to use the product for a year. With the larger companies particularly, there was an immense floating population who moved many times during the year, and the costs ought to be increased proportionately to take care of this class of business. Mr. Forstall's plan of charging 25 c. per month as a fixed charge would help out very materially; but he could not see that it did anything towards encouraging business they ought to have. He thought the question of the proper charges was one to which gas companies had given altogether too little attention, and one which in the near future would have to be considered very carefully.

THE PREPARATION OF METHANE.

In the "Journal" a few weeks ago, a full abstract appeared of the specification of the patent taken out by the late Mr. H. S. Elworthy, in conjunction with Mr. Sidney Williamson, for "Improvements in the manufacture of gas for illuminating, heating, and power purposes, and in apparatus therefor." The gas produced by the patentees' method differs from ordinary coal gas in this respect—that it contains less hydrogen and more methane. Recently M. Paul Sabatier has patented a process for the preparation of pure methane or a gaseous mixture rich in this constituent. An abstract of his specification, which is dated Oct. 28, 1905, appeared in a recent number of "Le Gaz," from which we take the following particulars.

The gases produced by the Riché or other system of reversed distillation in generators fed by wood or similar material are of the following average percentage composition: CH_4, 10 to 15; CO and CO_2, 20 to 22·5 per cent.; H, 45 per cent. In order to convert these gases into methane, M. Sabatier proceeds as follows: On leaving the generator, the gases, which have been purified by passing over copper turnings heated to about 600° C. are conveyed over nickel, iron, or cobalt, obtained by reduction of their oxides, or a mixture of them, and raised to a temperature of 500° C., at which the carbon monoxide is partially transformed into carbon dioxide, with a deposit of carbon upon the metals, and partially into methane. After passing the gases as indicated, a mixture is obtained which contains only hydrogen, methane, and carbon dioxide; the water which is formed being separated by condensation. To the gases thus produced there is added sufficient hydrogen to make with that already in the mixture a quantity about four times that of the carbon dioxide. The new mixture is then conveyed over nickel, cobalt, or iron, or over a mixture of these metals, heated to a temperature ranging between 250° and 500° C. Under these conditions, the carbon dioxide and the hydrogen are converted into methane and water. The latter is eliminated by condensation, and finally pure methane is obtained. This can be utilized for the production of a gas having very high calorific and illuminating power by adding to it acetylene and hydrogen, which, passing with the methane over iron, nickel, cobalt, or copper, at a temperature between 50° and 180° C., results in a gas containing methane, hydrogen, and carburets containing ethylene and formene. The operation could be stopped when the mixture of hydrogen, methane, and carbon dioxide had been obtained. It would then be possible to get rid of the carbonic acid by passing the gas through a suitable alkaline solution. In this way there would be obtained directly a mixture of methane and hydrogen which would be very rich in methane, and be susceptible of the same applications as pure methane, and could, like it, be transformed into a gas of very high calorific and illuminating power by the simple additions of carburets containing ethylene or formene, or any other suitable carburetting materials.

From Early Volumes of the "Journal."—July 11, 1853.

Roasting of an Ox by Gas.—The "Bristol Mercury" contains an account of the festivities at Pontypool, consequent on the birth of an heir to the extensive estates of Capel Hanbury Leigh, Esq., Lord Lieutenant of the County of Monmouth. The roasting of the ox, which used in the olden time to be a gross and often disgusting exhibition, was rendered by the aid of science a matter of deep interest. It was resolved to cook it by gas; and, under the personal superintendence of Mr. Vickery, Gas Engineer, of Exeter, and Mr. Price, Gas Manager, of Pontypool, the operation was effected in the following manner: A cylinder, composed of iron plates of sufficient dimensions to receive the carcass of the ox, which weighed when dead 1372 lbs., was fixed and encased in a stack of fire-proof bricks, and upon the inside of it were introduced circles of gas-pipes having numerous perforations. The ox was then suspended from a triangular erection, and the operation of roasting was commenced, and in about eight hours was brought to a very successful conclusion. It was found that the heat generated by the gas could be raised to 600° Fahr.; but it was kept at from 240° to 300°. The roasting yielded 140 lbs. of clear dripping, which, it was calculated, would realize a sufficient sum to cover all the cost of erecting the apparatus, the 5000 cubic feet of gas consumed, &c.

MUNICIPAL AND COMPANY MANAGEMENT.

The Subject Discussed by Water Engineers.

The question of the relative merits or otherwise of municipal and company management was debated at considerable length at the meeting of the British Association of Water-Works Engineers, last Saturday week, on a paper read by Mr. CHARLES H. PRIESTLEY, M.Inst.C.E., of Cardiff. Though the paper bore the title of "Municipal Ownership of Water Undertakings," both it and the discussion will be found to bear largely upon the general question of the comparative efficiency of the two forms of administration. The paper and the discussion have, owing to their length, been substantially curtailed.

In the opening passages of the paper, the author states that for many years past his firm conviction has been that the provision of the "first necessity of life" should be in the hands of the representatives of those for whom it is intended, and that the provision of water and the administration of all water undertakings should be entirely free from any question of making profit therefrom either by a municipality or a company. Rather should the price of water, especially that supplied for domestic purposes, be reduced, so that the free use thereof for all legitimate purposes may be encouraged with a view to the promotion of cleanliness in our persons, our houses, and our cities, towns, and villages. It is a well-known fact that where there is an abundant supply of pure water, together with good sanitation, the health of the community is the best, and a low death-rate follows.

The extra charges still made in many towns for baths and water-closets are most unjust to the poorer class of inhabitants. Why should the poor man be denied a bath where the nature of his occupation generally makes it more essential than it is in the case of the well-to-do man, whose work is of a cleaner description? Then, again, wherever good water is supplied at low rates for industrial and commercial purposes, it must be admitted that it has a tendency to increase trade, and to bring new works and manufactories within the district, helping to provide labour for the people, and thus bettering their condition. Provision for the future is a matter which should be constantly borne in mind, and any surplus income, instead of being applied to the relief of the rates, might well be husbanded and reserved for the purpose of providing new works and extensions whenever they became necessary.

Having dipped deeply into the history of the subject, the author said we have to-day many examples of water-works equal to, and in some cases superior to, those of the ancient world. Among the greatest of these works in Great Britain may be mentioned the municipal undertakings of Glasgow, Liverpool, Manchester, and Birmingham. These four cities alone have spent no less than £22,000,000 in providing themselves with a full supply of water from distant sources, free from the risk of contamination, and of a quality suitable for all purposes, amounting in the aggregate to about 150 million gallons per day at the present time. Is it probable or even possible that magnificent water-works like these, involving such an enormous capital expenditure, either could or would have been provided if these undertakings had been in the hands of private companies, who would have had to consider first of all whether there was likely to be any adequate return on the capital invested, and to whom the consideration of what was best in the long run for the consumers would have been a secondary matter?

The most striking feature of all these works is the attention given to the future requirements of the respective cities, allowing for the rapidly increasing consumption per head of the population, which is now common to all communities. Though in such cases it may be argued that the existing communities are being made to pay for future generations, the author ventures to think that few of the inhabitants of these cities would be willing to give up their present plentiful and constant supply (with the knowledge that their children will also have the same) for the inadequate and intermittent supplies they had previously been used to.

On a lesser scale than the great municipalities already mentioned, the author would like to quote the city of Cardiff as an example of which he can speak from personal knowledge. The original works, such as they were, were purchased some quarter-of-a-century ago from a Company which had supplied the town very indifferently. Cardiff was beginning to grow rapidly at that time, having a population of about 80,000, which has now risen to 180,000 within the city boundaries alone. The Company were proposing to extend the works in a manner which would have been barely sufficient to meet the then existing needs of the town and district, without taking any account of the rapid growth of population. During the first year of the municipalization of the undertaking, the Corporation instructed their Engineer (Mr. J. A. B. Williams, M.Inst.C.E.) "to investigate and report upon all likely sources of supply sufficient for the present and prospective needs of the town and district;" and the result of these investigations was the selection of the Taff Fawr Valley, over 30 miles distant from Cardiff, as a site for impounding reservoirs. This has proved to be one of the finest gathering-grounds in the country, and capable of supplying the needs of the city and district of supply, having a present population of 210,000, even should this figure be doubled in the course of future growth. About £1,000,000 has been spent in new works and improvements; and from the time of the purchase until now, the domestic supply has always been full and constant, with the exception of a short time in 1887, when the drought all over the country was unprecedented, and the new works were not ready for use.

Taking the whole of the cities and towns in the United Kingdom having over 50,000 inhabitants, and excluding the four above mentioned, it will be seen that there is a very decided preponderance of municipal water authorities as compared with the number of water companies. The author believes these figures are approximately correct: Cities and towns whose water undertakings are administered directly by municipal or other elected authorities number 73, with a population of nearly 10,000,000 and a capital expenditure on water-works exceeding £35,000,000 sterling; while there are 21 water companies, supplying a population of about 3,500,000, having a capital expenditure of from £7,500,000 to £8,000,000. Only three cities of over 200,000 inhabitants are in the hands of water companies. The Metropolitan Water Board have been left out of account in these calculations; but as the largest water undertaking in the kingdom recently municipalized, it is, of course, one of the foremost examples of the trend of public opinion in this direction. Many of these municipal undertakings were formerly in the hands of companies; and if there had not been good reasons for the change, it is hardly likely that so many of them would have been purchased by the municipalities.

The capital cost of water undertakings varies considerably, owing to the varying circumstances under which they are constructed; but a comparison of the scales of charges will show that generally those made by companies exceed those in force where the undertaking is administered by the municipality.

Some of the arguments used a little time ago by a leading engineer in favour of company as against municipal water supply appear to the author very feeble indeed. For example, it was stated "that the Streets Committee complain that no sooner has a street been formed or repaved than the Water Committee break it open to lay down a pipe." Surely this is a question of management, or, rather, mismanagement, and it is an easy matter for the engineer or surveyor in charge of the streets to give notice to his colleague in charge of the water-works when he proposes to break up any streets; and it is, or ought to be, an easy matter for the water engineer to arrange his work so as to avoid breaking up roads immediately after they have been made. In the author's own case, the City Engineer always sends a printed notice when a street is being made, widened, or even remetalled; and if any mains, services, or appliances are to be laid, additions or alterations made, the work is carried out before the street is completed. The author can better understand such a thing happening where the water-works are in the hands of a company or separate authority, when it is only necessary for the engineer in charge of the water-works to give three days' notice to the surveyor, and can then proceed to break up the street, even immediately after it has been made.

It has also been stated that the salaries in the finance department go up when the water-works are taken under municipal control. Surely it is more economical to increase the salaries of a few clerks and collect the water-rentals with the other rates, as is often done, and share the cost of the collector and staff with other departments than for the water undertaking to bear the whole cost alone.

The question of dealing with extensions of the water-works as the necessity arises, is one of much more moment; and, so far as the author's experience goes, he has found that municipal authorities always, and district councils in most cases, are more ready to expend money on extensions than water companies are—the question being in such cases whether or not there is an immediate prospect of increased rentals. Even in those cases where there is undue delay, and inconvenience results, the consumers of a municipal undertaking have the matter in their own hands at election times, when they may select representatives who will undertake to remedy the cause of complaint. The author, of course, recognizes that in the case of the large and more wealthy companies, as in the case of large municipalities, there is naturally less inclination to shirk responsibilities in this respect. The question of providing for future requirements also involves the following point of difference between municipal and company undertakings. It can hardly be expected that a trading company (who must of necessity look first to dividends) are likely to spend money on new works which may be unremunerative for a long period of time; whereas a municipal authority would feel themselves called upon to consider whether, and to what extent, the advancement and prosperity of the town would depend upon the provision made to maintain the water supply in the future.

The author does not for one moment wish to call in question the construction or administration of any particular undertakings in the hands of private companies—well knowing that in many instances such companies are administered with ability and foresight, and in the best interests of the consumers; but he contends that, in all such cases, the interests of the consumers *per se* must take a second place, and that the prosperity of the company as such must always be first in the minds of those having control of the undertaking. It may be alleged that the law compels water companies to do all that is needful in the interests of consumers. It has even been stated that, under municipal control, improvements are often neglected, while a company would be compelled to make them. But in the case of a municipal supply, the people

themselves are the real arbiters of the situation; and if their representatives do not carry out what is necessary to meet their requirements, they can put in men who will do so.

Discussion.

Mr. H. ASHTON HILL (South Staffordshire Water Company) held that there was no perfection in whichever class of management one might advocate—whether municipal or company. He had had experience as an official of a large corporation, of a district council, and of a company. As the result of this experience, he was not an admirer of municipal management; he preferred that of a company. He did not think it was right to speak of the Metropolitan water undertakings under the Water Board as having been municipalized. But he himself was an advocate of the formation of Water Boards in the case of groups of small communities. He thought it was a mistake for small municipalities, out of pure sentiment, to think they ought to have a water undertaking of their own. They now wanted the water, gas, electric light, trams, and all the rest of such things; and they had to have their separate offices and staffs, and the expenses of management were enormously increased. He therefore thought the best way of managing these concerns was by grouping them. Regarding death-rates, he did not know that corporations supplying water could be credited with lower death-rates than in towns served by companies. The London water supply had been administered up to recent times by Companies; and he thought the death-rate of London would bear comparison with the death-rate of any municipality. He next commented upon the variable and unsystematic manner of levying water-rates. In some cases, there was a very low rateable value. A company might have 5 per cent. on the investment, or even less; and they were allowed to charge extra for houses with baths and water-closets. If these charges were grouped together, it would be found that the poor man was not done out of his bath at all, because, going to a neighbouring corporation, it would be seen that their charges were very much in excess, although they included a free bath, &c. He protested against the assumption that companies had their eyes all the time upon dividends, and that a thoroughly efficient water supply for the consumers was quite a secondary matter. He put it that no water company could achieve success financially, or in any other sense, unless they carried out their parliamentary obligations. They had heard of municipalities in this country being without a supply during and after summer, and who turned off the water several hours per day. A company would not be allowed to do such a thing. If they did it, the municipality would confiscate them—buy them up at scrap-iron price. In this respect, he thought the ratepayers were better protected where a company supplied, because they could put the screw on to a much greater extent than they could on their own authorities. The author said that the people could send to their local councils men who would carry out their own ideas. What, he asked, would the candidates for municipal honours not undertake to do? One of the first things they generally proposed was to clip the wings of the water engineer and other officials, and see that their salaries were reduced. (Laughter.) The committee system, too, was a difficult one to work with; and the committees were hampered themselves. There was this committee and the other committee, and this official and the other official; and, even in walking along corridors, they had to be careful they did not tread upon one another's feet. The system cramped the energies of everybody connected with it; and no official could do the best that was in him. The author stated that only three cities of over 200,000 inhabitants were in the hands of water companies. He should like to know the names of those cities, so as to see whether the concern he represented was included. The reason that many transfers had taken place had been merely one of sentiment, and a desire on the part of municipalities to handle these trading concerns. As to the laying of services and tearing up streets, he did not see there should be any difference between a company and a department of a corporation. He knew of a case where there was a great deal of friction in this respect between the corporation officials; and the water company of the town were held up as an example of the way in which work should be done. In fact, he had heard the wish expressed that the gas department would do their work as well as the water company did theirs. As to the collection of rates, he believed in separating them.

Mr. PRIESTLEY said the three cities to which he referred were Newcastle, Bristol, and Portsmouth. He did not take into consideration the two or three Companies (the largest of which Mr. Hill represented) who did not supply in one city or town.

Mr. W. MATTHEWS (Southampton) thought it went without saying that any large concern could be much better managed by five or six gentlemen sitting round a table, and discussing their affairs in a reasonable and rational sort of way without members of the Press being present, taking down every little tittle-tattling remark that was made, than by 40 or 50 members clamouring to have every detail in a negotiation discussed before the thing was completed. From this point of view, companies obviously started with an advantage. As to charges, he thought the reason why they were greater in the case of companies than in municipalities generally was that there was no sort of relationship between the charges made and the costs. The charges, in the first instance, had been settled by Act of Parliament before a company got into operation, and before they could possibly know to an absolute certainty what the supply was going to cost; and there were many cases, no doubt, where the charges might have been reduced, except that there was a natural hesitancy on the part of the company, having liberty to charge on a certain scale, to reduce those charges. Regarding extra charges, if he were advising a company, he should say: "Abolish them." They gave rise to much irritation, and, to a large extent, they were illogical. What additional expense was a company put to from the fact that a house had two, three, four, or five closets? Surely the user of the convenience was not increased because the number of closets was increased. Mr. Hill had called attention to the fact that some municipalities had undoubtedly had shortages of water, forgetting altogether there had been exceedingly glaring cases where companies had been short of water. It was within his knowledge that several cases of municipalization of water supplies had arisen out of the fact that there had been shortages year after year; and had the companies fulfilled their statutory obligations, they would have had to have spent such large sums of money that the dividends must necessarily have dropped.

Mr. W. H. HUMPHREYS (York): Cannot you state what cases they are?

Mr. MATTHEWS: The Chesterfield case was one.

Mr. C. E. JONES: What? I will have a word about that.

Mr. MATTHEWS: And the Devonport case was another.

Mr. HUMPHREYS: Are those all? You have only mentioned two small cases.

Mr. MATTHEWS (proceeding) said he agreed with Mr. Hill that the question of the administration of water-works had largely to do with the question of its size. No doubt it was a very ridiculous position that there should be a huge number of small undertakings about the country where the cost of administration, of course, must be enormous in proportion to the volume of work they were doing; and it would be much better if they were grouped together. The only way that this could be done was by legislation. There were a number of districts, he was prepared to admit, which, except by the aid of companies, could not have been supplied, and would not have been supplied; and this arose from the fact that it was next to impossible to get the various local authorities to act in a combined force.

Mr. EASTON DEVONSHIRE, though a water company man, said he agreed with the author of the paper to this extent, that it was the first duty of any local authority to supply water to its own area, either directly or indirectly—that was to say, if the authority could not find the money, then they ought to get somebody else who could. He thought a distinction should be drawn between large cities and the smaller communities. There was no question at all that it was the first duty of a large city to supply water as a separate authority. In the case of the smaller authorities, it was absolutely impossible to so combine them as to be able to obtain a supply of water at any reasonable cost; and they must therefore have recourse to private enterprise to get a supply. Of course, this was on the assumption that there was no legislation (which might be expected some day) which would supply another means through water boards. It was quite conceivable that water boards could be appointed without any great difficulty. Some might say this could be done through the mechanism of county councils; but it would not be fair for the rating authority to take up the supply of urban and rural districts together. To obtain the necessary money, they must do it by rating, and apportion the money. A county council would have to rate the entire county; and the whole county would include many districts which already had their own supply, and bore the expense of it. He therefore saw a difficulty in this question of water boards, be they part of the county council or separate boards. For small communities, therefore, they had to have recourse to private enterprise. He therefore thought that water companies had done, and were doing, an immense amount of good work. At the same time they were hardly treated. At the outset, they were opposed by the very persons who were to benefit. An Act was obtained, capital and water found, and mains were put in; and they were at once rated. For some years no dividend was earned. After years of struggling, the Company began to earn a dividend, and when they got up to 5 per cent., people said what an abominable thing it was. He held that, where an authority found they were unable to provide the funds for the necessary water supply, then more assistance should be given to private enterprise than was at present the case. With regard to baths, he pointed out that there was nothing to prevent anybody having one that was not fixed without paying extra for it. Concerning the figures as to the relative expenditure by local authorities and water companies (given in the paper), he found that the average cost of water undertakings carried out by municipalities was £3 10s. per head of the population, and by water companies £2 5s. per head; and he thought they might accept it as a fact that, in this country of ours (which, generally speaking, was extraordinarily well supplied with water), taking the one with the other, there was nothing to choose between quantity or quality of supply either from a company or municipality. Why, therefore, he asked, should it cost 50 per cent. more in the case of municipalities undertaking the work? Mr. Priestley might say they were doing work for future generations. Then he (Mr. Easton Devonshire) would contend they were doing too much, and extravagant, work. However, before they could arrive at any absolutely definite conclusion as to which was the best and most economically conducted of the two systems, they would require statistics for the whole country.

Mr. Frederick Griffith (Leicester) also pointed out that the water authorities owed a deep debt of gratitude, in the main, for the water supply of the country to the original promoters of water undertakings—the water companies. The whole of the water undertakings of the country, so far as he knew, were fostered by companies, and gradually they became municipalized for causes which were individually better known to themselves than they were generally to the public. On the point of charges, he contended that it was imperatively necessary some charge should be made for water-closets, baths, and other supplies, because, if they extended these services and made no charge for them, it would be found that the waste from the extra services would be intolerable. Here he might say that, in his own case, he had reduced the waste to such an extent (without the aid of any detection meter) that the supply was now 13 gallons per head per day for trade and domestic purposes. Where they had borrowed money to pay off the debt of construction, they were not justified in giving free of charge any water until the capital charge had been repaid. As to the collection of rates, the Acts of Parliament which they were obliged to enforce for the collection of water-rate arrears did not run on all-fours with those of the authority collecting the municipal rates. They had to resort to the cutting off of the services and the issuing of summonses, and had to proceed on different lines altogether. Therefore any attempt to collect the rates together would, he maintained, cost more than it would involve to collect them separately. With reference to the roads, there was no doubt that this was a very vexed question; and the difficulties were increased by the introduction of the electric tram system—not only in connection with services, but with street and rider mains. His own view of the matter was that there should be distributing mains on each side of the track; but this was not always possible. It was a very serious matter where they had services running under the tram-line, and bursts happened in the centre of the track, because, this being constructed of cement concrete, and laid down in such permanent fashion, it cost a very large sum to get underneath to repair any waste taking place there. Respecting shortage of water, unfortunately they were at Leicester in that position now. They had gone down owing to the shortage of rainfall; and they could not distribute what they had not got. At the present time, they had only about 35 days' supply in stock. It therefore behoved them to be very economical in the distribution of water. On their system they had 270,000 persons, something like 65,000 houses, 63,000 water-closets, and a trade supply of something like 5 or 6 gallons per head; and they did the whole on 13 gallons per head. The difficulties with regard to burst mains and services and the breaking up of the streets were caused by matters over which they had no control, such as heavy traction, and expansion and contraction owing to changes of temperature; and a new difficulty had cropped up—that was, electrolytic action on the mains.

Mr. W. H. Humphreys (York) said this was a subject that, with due respect, he thought should not have come before the Association in its present form. They were really asked to discuss the actions of their masters. They were all either in the service of corporations or companies; and, for his own part, naturally, as a company man, he could not be expected to say anything against his own Company or the management. It would be most unreasonable. The same with respect to the corporation men. They were so "cabin'd, cribb'd, confin'd" in expressing their opinions on this subject that, unless they went only into mere platitudes as Mr. Priestley had done, they could not possibly get to the top or bottom of these things. It was not likely that anything Mr. Priestley or anyone else said, was going to convince him (Mr. Humphreys) that he was wrong in the opinions he held from his own experience. He could himself adduce a good many facts relating to the *pros* and *cons* of these things; but he felt he could not do this with the same liberty as if one was entirely a free hand. They had heard a great deal about making profits. Practically the sole reason why, in most cases, municipalities desired to take over companies was because they had profits. What did this profit mean? He knew of a company who went to Parliament not long ago to get their capital increased. It was increased by about £60,000; but Parliament said: "Your dividend on this capital shall be limited to 3½ per cent." Now a good many corporations were issuing loans at 3½ and 3¾ per cent.; and he knew of some cases in which it was 4 per cent. For a shareholder taking a profit or a company giving a profit, they were doing no sin; they were not paying the shareholders 5 or 7 per cent., or more than a corporation would be paying if they had the management of the waterworks themselves. Why were the companies in existence at all? Simply for the reason that, with four exceptions, the whole of the water undertakings in this country were started by private enterprise; and if it had not been for that, we should have been sadly behind the times now. If they eliminated private enterprise out of everything in this country, they must take a back seat. On the question of roads, he saw no difficulty whatever, if the commonsense idea of the thing was taken up. In his own case, the City Engineer regularly handed him a list of the roads it was intended to pave, repair, relay, or anything of that sort; and when his Company intended to extend or enlarge their mains, he always asked the City Engineer when would be the most convenient time to do it. In the past seven years, by this interchange of consideration, there had not been the slightest difficulty, or an atom of friction. With reference to the breaking up of roads, they had a list of charges. If it was macadamized road, it was 3s. per square yard, or concrete with wood pavement 7s.; so that they knew exactly what the whole thing was going to cost.

Mr. W. Jones (Pontypridd) considered that water supply should be a national matter—whether by the formation of water boards, or in any other manner that might be generally approved. The point he wished to specially refer to was the way in which charges were made in connection with municipal administration. Though he was the Manager of a Water Company, he happened to be a member of the District Council; and there he saw for himself how things were being managed municipally. Oftentimes, when they, in carrying out their duties, had a charge that should go to (say) capital or maintenance, he found there was a tendency on the part of these authorities to charge certain payments to accounts which were not immediately concerned. He would give an instance. In his town they had a tramway undertaking. In laying down the track, it was necessary to remove a long length of water-main and also a gas-main. The diversion of the Water Company's main was paid for from the proper source by the Council; but when it came to the gas-main, it was decided to be a question for the Council's gas undertaking, and not the tramline. Although it was properly a charge on the tram undertaking, the expenditure of about £700 was unreasonably charged to the gas undertaking. There they saw an example, through municipal management, of the misapplication of the funds of the public. These were things they should bring before their representatives, so as to see that their undertakings were not handicapped in this way. Regarding water-rates, that was a question for Parliament; they must not blame the water companies for them. He had two instances in mind where the district council purchased the water undertaking. When they came to manage it, they found the rates obtainable were insufficient to meet their demands; and they actually went to Parliament and asked them to increase the rates. He should be glad to see one common charge for water supply; for the extras were a source of difficulty. He also considered that it was sometimes an advantage to the ratepayers to have the water supply in the hands of a company rather than a municipality—pointing out the leniency of a corporation to their own committees, as compared with their strictness over a company. He commented, too, upon the frequent change in the *personnel* of the committees, and the perpetual fresh instruction, and concluded with an expression of thankfulness that he was Manager of a Water Company.

Mr. A. R. Smith (Kettering) spoke in favour of municipal ownership, from the point of view of the care of the watershed or collecting area, where the water supply was so obtained.

Mr. A. B. E. Blackburn (Sunderland) also gave credit to water companies for the origination of water supplies. In the case of municipal ownership, owing to the want of continuity of direction, they did not, in his opinion, get the interest taken in the welfare of the water undertaking by the members of the corporation that they did in companies. He thought the interests of consumers were safeguarded in the case of company ownership by adequate statutory provisions, as well as, in these days when the trend was towards municipalization, by the knowledge that the companies always had that, in the event of purchase, the price obtained for an undertaking would be much less if they did not adequately look forward and assure the future by necessary extension. Regarding the point as to charges, taking nineteen of some of the largest towns in England in which the water undertakings were owned by the municipalities, and comparing the charges made by them with those of the Company he had the honour to represent, he found his own Company's charges came within the lowest ten.

Mr. E. J. Silcock (Leeds) supported the views of the author, though he was free to admit there were many municipalities in this country who had not perhaps done what was their duty in connection with water supply, and he thought that similar instances could be found among the water companies. They must, however, keep in view the broad facts that water was a necessity, that the supply of a necessity was not municipal trading, and that water companies were not philanthropists. It seemed to him they could not dissociate from the administration of a water company the profit-earning element. That must be, and was bound to be, the centre of all their doings. Turning to the question of water boards, he agreed that, in the case of many of the small undertakings in the country, the association of districts would be a very great advantage. This was admitted by every member of the Association; and it clearly came within the definition of municipal control. As to water shortage, he was bound to say that, in his experience of cases of purchase of companies by municipalities, in most of them the insufficiency of the water had been one of the main features. The control of gathering-grounds was also a very important element; and he thought he was right in saying that, so far, no water company had had the courage to purchase the whole of the gathering-ground, as had been done by a number of municipalities.

Professor Henry Robinson expressed his entire concurrence that watersheds and water supply generally required to be under better control. Watersheds and other sources of supply were monopolized for small purposes which were capable of being extended to large purposes; and it was not likely a company would be expending capital which was not remunerative. The whole question deserved consideration from a Department of State, or at any rate it required to be dealt with on a much broader basis than it was now.

Mr. C. E. Jones (Leyton) said he had been an officer of local

authorities as well as companies; but he had not intended to take part in this discussion, because evidently the meaning of the author —the municipalization of water—was so apparent that he had, in his (Mr. Jones') opinion, done some injustice to private enterprise which supplied water to the people when huge polities were asleep, and there was no possibility of awakening them from their lethargy. As Chesterfield had been pointed at with some acrimony ——

Mr. MATTHEWS: I beg your pardon—not acrimony.

Mr. JONES: Pointed at with some warmth of feeling [laughter], he should like to inform the meeting of the shallowness of Mr. Matthews' contention. The Municipality was not entrusted with the water supply of Chesterfield. Chesterfield, in his time, supplied eleven public authorities, with all of which he was at peace. After nine years of deficient rainfall, the Company proposed to construct a reservoir of somewhat large dimensions. Then, of course, these eleven local authorities found they had an interest in the business, so they combined for opposition. The Company went to Parliament; but before they went, the Directors had agreed to sell to the Corporation, and the Corporation fell into the trap, and they wanted to buy—of course, at their own price. They went to Parliament, and Parliament positively refused to give the Corporation either the control of the gas or the water, and formed a separate Board, which existed that day. What then became of the municipality? The shallowness of the contention that a municipality could do these things much better than a water board was apparent. What did they find in the Metropolis? The same thing repeated. Parliament declined to trust the Metropolitan Water Supply to the County Council, the Corporation of the City of London, or any of them. They did the same as at Chesterfield. They formed a Water Board; and he contended that a water board under the circumstances was the correct thing.

Mr. HUMPHREYS remarked that, when Mr. Matthews was speaking, he asked him to give cases; and he only quoted Chesterfield and Devonport. Upon Mr. Jones's explanation, he would now ask whether Mr. Matthews would redraw his statement.

Mr. MATTHEWS said his authority for it was Mr. George Hill, of Manchester.

Mr. HUMPHREYS said there was one other point. It had been stated by more than one member that companies were anxious to make a profit at the sacrifice of quantity and quality. After twenty years' connection with private water-works undertakings, he stated, on his honour, that he had never known such cases to occur.

Mr. BALDWIN LATHAM had had experience of both water companies and local authorities, and did not think there was much difference between them. However, he preferred the management of a water company. A board of directors was a much smaller body; and they dealt more directly with matters than did local authorities. In the latter case, questions had to go before the committee, and then had to be confirmed by the corporation afterwards. The water companies were the pioneers, and had done an immense amount of work; and even now there was not a year passed without new water companies being established, because local authorities would not spend money and incur liabilities, but left it to the speculation and philanthropy of gentlemen in the neighbourhood.

Mr. PRIESTLEY, in the course of his reply, said he looked upon all water boards as part of municipal administration. Mr. Jones had said that at Chesterfield there were representatives of the Council on the Board, and how could that be anything but a municipal administration? The same with the Metropolitan Water Board; it was ridiculous to say because the County Council had not got all, it was not a municipal representation. Regarding water charges, he did not think there was any water company who would not make their maximum dividend if they only had the chance.

The subsequent proceedings at the meeting will be noticed in subsequent numbers of the "JOURNAL."

The Gas Question in Paris.—The adverse vote of the French Senate on the Gas Municipalization Bill, to which reference was made last week, caused some little commotion among the members of the Municipal Council. At the meeting on the 15th inst., the Prefect of the Seine alluded to the matter, and suggested that, at the sitting of the Budget Committee on the following Monday, they should consider the consequences likely to result from the Senate's action. Of course, in view of the present position of affairs, the proposed loan has been abandoned. The subject duly came before the Committee, and the Prefect addressed them upon it at some length. He said the Administration required instructions as to what to do—whether they should make some provisional arrangement for carrying on the service for a year, or leave the Gas Company to procure the nomination of a sequestrator or judicial administrator. In the event of an arrangement being come to, the Prefect thought that it would be possible to have the gas supply controlled temporarily by managers nominated by the City and by the Company's Liquidators. In the result, the Committee asked the Prefect to submit a scheme for carrying on the undertaking during the coming year, reserving all the rights of the City in respect of the Company's works and property.

REGISTER OF PATENTS.

Intensified Gas Lighting.—Scott-Snell, C., and the Air Light Company, Limited, of Victoria Street, S.W. No. 28,405; Dec. 27, 1904.

In patent No. 13,670 of 1904, a system of incandescent gas lighting was described in which air at low pressure meets the gas at the burner and is mixed in a mixing-tube. This system, where a number of burners are to be supplied, involves the use of large ducts, and on this account in some cases is objectionable. The object of the present invention therefore is to provide means whereby a small supply of high-pressure air may be used for supplying the necessary air for combustion to the lamps.

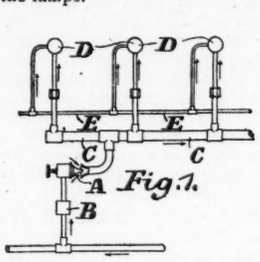


Fig. 1.

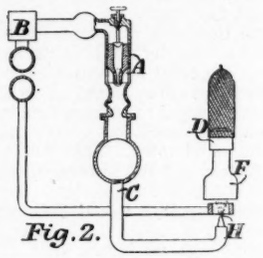


Fig. 2.

Fig. 1 is a circuit diagram of the separate air and gas lighting system. Fig. 2 is an elevation showing the method by which the air is introduced at the burner-head.

The injector device A supplies air at high pressure (say, about 80 lbs.) through a reducing valve B, for the purpose of steadying the pressure. The injector is set to feed the necessary air for combustion at a pressure of about 2 lbs. through a low-pressure air-supply pipe C to the lamp D. The lamps are fed in parallel from the air-supply pipe, and the air supply to the burners is kept continually open, so that when the apparatus has been initially set, no further adjustment is required. When a lamp is required to be lighted, the gas, which is supplied by a pipe E leading to a mixing-tube F, at the burner is turned on, and a combustible mixture is formed with the inrushing air. When any lamp is extinguished, the air supply to the lamp escapes through the lamp funnel, so that there is a constant load on the apparatus which supplies the high-pressure air. When all the lamps are extinguished, the air supply is, of course, cut off.

The air to the burner is preferably introduced in a central stream H (fig. 2); while the gas enters the burner mixing-tube in an annular stream.

Prepayment Gas-Meter Mechanism.—Rotherham, K., and Johnson, W., of Coventry. No. 245; Jan. 5, 1905.

This invention has for its object to provide prepayment mechanism, applicable to most existing meters, in which, when a shaft has to be rotated to wind up the mechanism, the shaft is rotated by reciprocating action performed by the user, the length of the stroke being adjustable according to the supply standard. Further features are that the mechanism actuated by the reciprocating action is brought into operative position with the operating mechanism of the meter by the coin itself, and is restored to the inoperative position when the coin is carried away; also the engagement of the mechanism with the operating mechanism of the meter is brought about by an intermediate member which does not partake of the reciprocating action as does the mechanism.

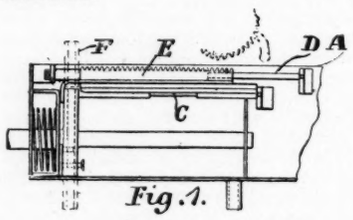


Fig. 1.

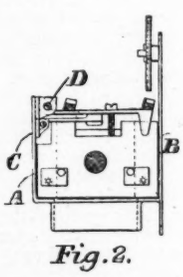


Fig. 2.

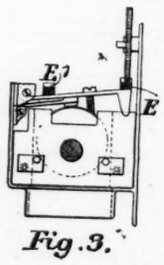


Fig. 3.

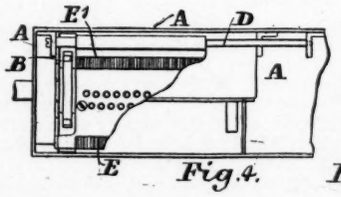


Fig. 4.

Fig. 5.

The accompanying drawings illustrate, by way of example, only a convenient construction embodying the invention as applied to a gas-meter.

Fig. 1 is a rear elevation of the meter with the back plate removed. Fig. 2 is an end elevation viewed from the left of fig. 1, with the end plate removed. Fig. 3 is a similar view showing the parts in operative position. Fig. 4 is a plan of fig. 1. Fig. 5 is a detail.

The mechanism is mounted on the back plate of the meter. Built on this wall is a compartment A, in which a coin-carrier B is adapted to slide. The carrier is provided with a slot to receive the coin, and has

secured to it at one end a rod which extends outside the compartment A, and may be provided with a push handle. On the opposite side of the carrier a second rod is attached, which passes through a support secured within the compartment—these two rods passing through supports which serve as guides for the carrier.

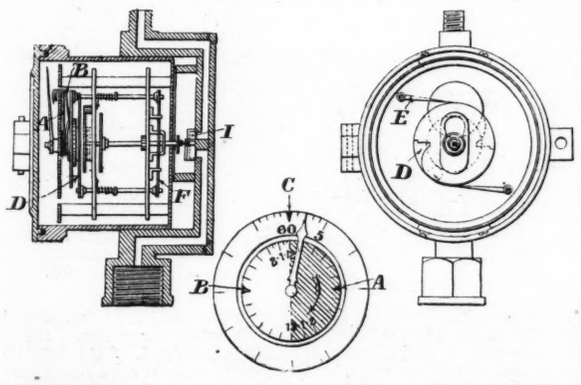
On one side of the compartment A brackets are mounted for the purpose of carrying a rod C, on which is pivoted a lever extending throughout the length of the compartment A, and bevelled at the end nearest to the carrier when the latter is in the position shown in fig. 1. Above the rod a second rod D is mounted in brackets, and pivoted on this rod is a platform free to slide along the rod D as well as pivot thereon, and provided with a series of screw-threaded orifices adapted to receive a pin, which extends downwardly from the platform into the path of the carrier B, but lies opposite a recess in the carrier, so that it does not foul. The platform has secured on its upper face two racks E and E^1. The rack E is adapted to engage a wheel, pivoted to the back plate, but normally the rack is out of engagement with the wheel, as shown in figs. 1 and 2. A pawl is also pivoted to the plate A, and engages the teeth of the wheel. The end of the platform nearest the carrier has a downwardly directed tongue, which takes over the carrier, as shown in fig. 1.

The operation of the device is as follows: So long as no coin is placed in the carrier B the latter can be reciprocated, but does not affect the meter mechanism. Above the carrier a shoot F (fig. 1) may be provided to guide a coin placed therein into the slot of the carrier. If the carrier is now advanced, the coin will strike the bevelled portion and raise the lever on the rod C, as shown in fig. 3. The lever in turn raises the platform on the rod D, so that the rack E engages the wheel connected with the meter mechanism. Thus more or less gas is allowed to pass according to the amount of rotation imparted to the wheel, and the pin, which normally clears the carrier, as described above, is now caught by the coin, so that the platform is advanced along its rod D as the carrier is pushed forward, and as it advances the wheel is rotated. The forward movemeut of the carrier is continued until it is brought against the support on the carrier B, when the coin drops through an outlet into a suitable receptacle. As soon as the coin has dropped, the lever and platform fall back into the position shown in fig. 2, so that the racks E and E^1 are again disengaged from their respective mechanisms, and the platform can be returned. The return movement is effected by the carrier engaging the tongue on the platform.

It will be seen that by placing the pin in one or other of the orifices on the platform the amount of motion imparted to the wheel, and, consequently, the amount of gas given for each coin, may be varied. The holes may be conveniently staggered as shown in fig. 4, and numbered according to the supply standard. Thus in a gas-meter the holes might be marked with varying numbers representing the number of cubic feet supplied for 1d., according to different standards. The ratchet shown prevents backward rotation of the wheel, and thus also prevents the carrier from being withdrawn in a backward direction before the coin has been discharged through the outlet.

Automatic Gas Lighting and Extinguishing Apparatus.—Boult, A. J.; a communication from La Société Japy Frères et Cie., of Beaucourt, France. No. 3923; Feb. 24, 1905.

This apparatus is intended for the automatic lighting and extinguishing of gas-burners at certain predetermined times, and relates to the type of apparatus in which the gas-cock is operated by cams which, in turn, are moved by clockwork. The lighting by this apparatus taking place in a gradual manner, its use is especially suitable for incandescent burners, more particularly in cases where a glass chimney is used.



The working of the apparatus shown is as follows: The bye-pass flame burns in the centre of the incandescent mantle so long as the ordinary flame remains extinguished; this being the case in the central arrangement of dials. The lighting index A is pointing at 6 o'clock p.m., and the extinguishing index B at 6 a.m. The two indices rotating with the circular dial during its automatic movement successively arrive opposite the zero point of the annular dial marked 60, for the purpose of producing the effect desired. When the lighting index, carried by the clockwork movement, arrives opposite the zero point of the annular dial it will be 6 p.m., and the lighting will take place at that moment in the following manner.

The lighting cam D, having brought the edge of its first recess to the end of the lighting lever E, the latter will fall into the recess under the action of its helical spring. At the same moment a blade, secured to the same spindle, will push the slide F to a given extent. This slide will transmit its movement to the pin G, and, through the latter, to an arm provided with a pin normal to its plane, which plays in the fork H of the valve, so that it will participate in the movement of the bar.

In its rotation, the valve, by means of its two radial inner partitions, will establish communication between the gas inlet and outlet ports; a small quantity of gas being still allowed to escape to the bye-pass. This is effected by one of the partitions coming into position across the inlet opening, and allowing gas to issue on either side. The bye-pass flame, continuing to burn, will light the gas at the moment when it arrives at the burner, even if this is not immediately. This first stage of lighting results, therefore, in the avoidance of any failure to light which might have been caused by a certain quantity of air escaping from the burner before the gas; the first recess in the valve being made in such manner that the total lighting period lasts about five minutes.

The clockwork continuing to drive the cams, the lighting lever, having arrived at the edge of the second recess, springs into it and completes its travel by driving the slide and the valve; whereupon the latter—always by means of its inner partitions—will stop all communication between the gas-inlet port and the bye-pass, whereby the bye-pass flame will be completely extinguished, and at the same time the passage between the gas-inlet and the gas-outlet ports will be left perfectly free, so that the burner will be completely lighted.

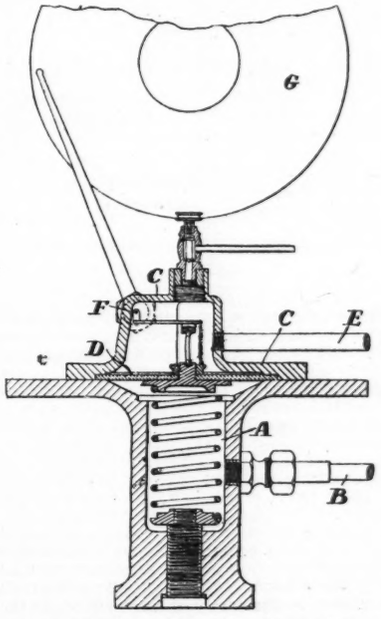
The burner remains lighted in an uninterrupted manner all the time that the circular dial continues to drive the two indices. The lighting cam, by means of its eccentric, raises the lighting lever in an imperceptible manner (without sudden effort, which could stop the clock) and brings it to its circular periphery, during which time the helical spring is again moved to its operative position. The valve I remains in place under the action of a flat spring arranged so as to prevent it executing any movement other than that which might be imparted to it by the slide.

When the extinguishing index arrives, in its turn, opposite the zero point C of the annular dial—that is to say, at 6 a.m.—an identical action, but in the opposite direction, takes place as regards the slide, and, consequently, the valve. That is to say, at the first stage, communication is established between the gas-inlet and the bye-pass, the burner still continuing to burn; so that the total extinguishing lasts about five minutes. At the second stage, the gas-outlet is closed, and the bye-pass completely open. The latter, therefore, alone remains lighted.

It will thus be seen that the operations described effect the lighting of the burner at 6 p.m. and the extinguishing of it at 6 a.m. But, assuming that it is desired to modify these times, and to light at 8 p.m. and extinguish at 2 a.m., the apparatus will have to be set in the following manner: By hand, pushing the indices in a clockwise direction, the lighting index A will be brought opposite the figure 8 of the small dial, on the hatched side of same, and the extinguishing index B opposite the number 2 of the dial on the blank side.

Liquid-Meters.—Kent, W. G., of High Holborn, W.C. No. 7584; April 10, 1905.

Heretofore with Venturi meters, the pressures from the throat and up-stream of the Venturi tube have been taken to the two legs of a U-tube containing mercury; but according to this invention (instead of the U-tube) a flexible diaphragm is used whose edges are fixed, and to the opposite sides of which the pressure from the throat and up-stream are communicated, while the movements of the diaphragm operate a pen for tracing a diagram, an integrating mechanism, or both. The diaphragm is composed of india-rubber, reinforced on one or both sides by metal laminæ; and a spring is provided tending to resist the up-stream pressure; while the movements of the diaphragm move a spindle which passes out through the walls of the diaphragm chamber and turns an arm carrying a pen to trace a diagram on a clock-driven disc.



The cylinder A communicates, by the pipe B, with the throat of the Venturi tube. The top of the cylinder has a flange between which and the cap C is secured the diaphragm D supported by a spring the bottom of which rests on a disc capable of adjustment by a screw, while its upper end bears against a disc beneath the diaphragm. The cap is

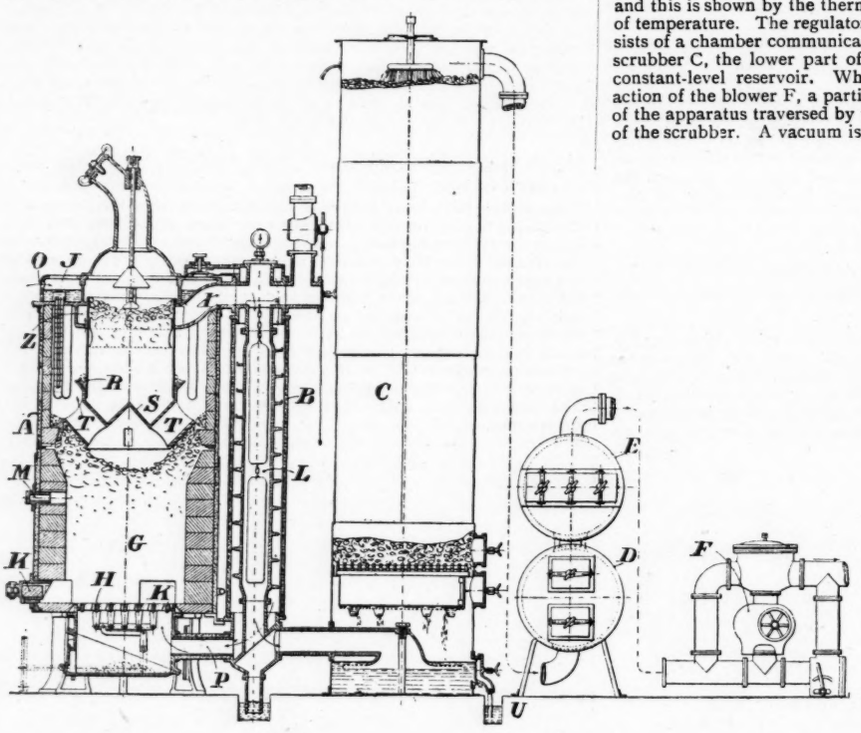
connected to the up-stream part of the Venturi tube by the pipe E, the result being that the greater the flow through the tube the more is the central part of the diaphragm depressed. F is a spindle passing out from the interior of the cap through a stuffing-box; and fast on the inner end of the spindle is a bell-crank lever whose further end is held down by a spring, while at an intermediate point it is separated from the stem by two knife edges, so that when the diaphragm is depressed the spindle F is rocked, and an arm on its outer end is moved so that a pen carried by it traces a diagram on a clock-driven disc G.

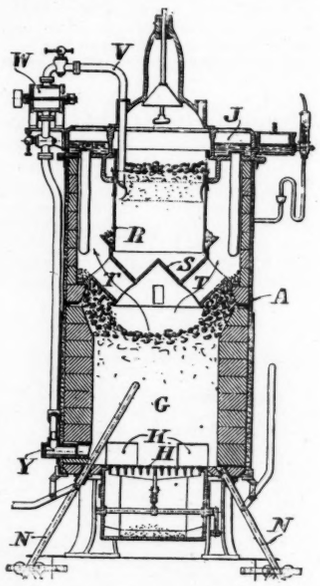
Gas-Producers.—Genty, L., of Marseilles, and the Société Nouvelle des Etablissements de L'Horme et de la Buire, of Lyons, France. No. 8918; April 27, 1905. Date claimed under International Convention, May 9, 1904.

This invention has for its object to provide a plant for the production of "poor gas from low-priced fuel," which, on combustion, produces a large amount of volatile matters and ashes. The apparatus is operated by suction, independent of the apparatus to which the gas is supplied—the gas being delivered to the apparatus under pressure by a blowing device.

The installation comprises a producer A at the side of which are arranged a heat regenerator B, a scrubber C, purifiers D and E, and a blower F. The producer proper comprises a shaft G, in which the combustion takes place of the fuel resting on a grate H, having toothed and jointed grate-bars arranged above an ash-pan depending from the producer and capable of being easily removed. At the lower end of the shaft are cleaning doors K, and at various levels doors M are provided for stirring the charge. Around the base of the producer are arranged oblique fire-irons N entering the shaft G at the lower part of the producer. They are operated by levers, and are used to prevent the formation of clinker obstruction within the mass of fuel, and insure its regular descent—an "essential to the obtainment of gas of uniform composition and good calorific power."

The fuel is charged in at the upper part of the producer through a hopper having two doors, the lower one operated by a rod. The fuel falls into a metallic retort R arranged above the conical deflector S.





The fuel, sliding on the inclined surface of this cone, is distributed on the periphery of the shaft G after passing between inclined passages T, through which the gases produced pass into the upper part of the apparatus.

From and below the base of the conical deflector, the fuel forms (by virtue of its natural angle of repose) a circular slope presenting a concave recess opposite the base of the cone. It is in this recess that the gases are evolved from the fuel burning in the shaft G.

In consequence of this arrangement, the thickness of fuel to be passed through by the gases, reckoned from the grate level, is said to be much less at the centre of the shaft than it is at the periphery; so that the passage of the gases, and the combustion, are much more active at the centre of the gas-producer than in the neighbourhood of the refractory walls, the temperature of which is thus moderated.

As the feeding of fresh fuel takes place along the walls, while the consumption of the fuel occurs more especially in the centre, the ashes and clinkers collect in the centre rather than along the walls, and, owing to the temperature along the walls being moderated as mentioned, the clinker does not adhere to the walls of the shaft.

When the exhausted fuel reaches the neighbourhood of the grate, the ashes are caused to drop into the ash-pan by the oscillating motion imparted to the teeth of the jointed grate-bars by any suitable lever arrangement. Clinker that may have formed compact masses which cannot pass through the grate is removed by a hook inserted through either of the cleaning doors K.

While the fuel remains in the retort R and on the cone S, it is highly heated by the gases evolved under the deflecting cone and escaping through the passages T, and circulating round the retort; so that the fuel, before it reaches the shaft G, "is deprived of the tarry matters which it contains and which would pollute the gas if allowed to mix with it."

The distillation products are drawn through a pipe V by means of a fan W, which forces them into a nozzle Y opening into the lower part of the shaft above the grate—the distillation products being thus burned with the fuel.

The gases produced in the shaft G by the action of the mixture of hot air and steam on the incandescent fuel, after evolving under the conical deflector S, and passing through the passages T and circulating round the retort R, pass into an annular collector Z surrounding the top of the retort, from which they are drawn into the pipe I and the heat regenerator B, which they traverse in a downward direction through the internal tube; the gases being constrained to impinge on the walls of the tube by metal cylinders suspended in it and acting as "heat-storers."

Above the producer is arranged an annular boiler J, provided with water circulation or field tubes arranged round the retort L. The boiler is fed by a constant-level reservoir with a float, which reservoir feeds also a regulator for supplying the water required for an additional supply of steam as hereafter explained.

The air enters the producer through the openings O in the boiler J, under the action of the reduced pressure created by the blower F, and the air becomes laden with steam by coming in contact with the evaporating surface of the water in the boiler, and passes thence into a passage kept open while the producer is working, and descends the helical path forming the external part of the heat regenerator B, and is heated by contact with the walls of the tube L and the fins forming the helical path, and finally reaches the ash-pan through the passage P. It then passes through the grate and into the fuel in the shaft G.

Usually the steam supplied by the boiler J and depending tubes is sufficient for the regular working of the producer; but when the gas production is beyond the normal, the vaporization becomes insufficient; and this is shown by the thermometer indicating an abnormal elevation of temperature. The regulator is then brought into operation. It consists of a chamber communicating, by a tube, with the top part of the scrubber C, the lower part of the chamber communicating with the constant-level reservoir. When the producer is working under the action of the blower F, a partial vacuum is created in the various parts of the apparatus traversed by the gases, and more especially at the top of the scrubber. A vacuum is at the same time created in the chamber, and causes a jet of water to issue through an opening of the passage communicating with the reservoir, which water passes into a funnel and thence to the helical fins surrounding the tube L of the heat regenerator, so that it is evaporated and mixes with the hot air on its way to the shaft G. The water-jet nozzle being above the water level in the reservoir, no water issues so long as the depression which takes place at the top of the scrubber does not correspond to a head of water greater than the distance between the nozzle and the level in the reservoir. As soon as the output of the gas-producer exceeds this limit, the partial vacuum produced in the chamber is sufficient to cause water to pass out with a force in accordance with the degree of vacuum produced by the blower. The proportion of water thus supplied is regulated by the diameter of the nozzle and by adjusting a hand valve. When the production of gas decreases, the flow of water decreases, or ceases, and the steam from the boiler J is alone used.

On leaving the heat regenerator, the gases are drawn through the passages Q at the lower part of the scrubber and pass under a perforated plate, by which they escape in small bubbles through a thin layer of water, the depth of which is adjusted by a weir, through which the water which has served to wash the gases passes, before it is drawn from the scrubber by the pipe U. The gases then flow up through the perforated bottom of the vessel X, into which trickles the water from the material in the scrubber. The depth of the layer of water through which

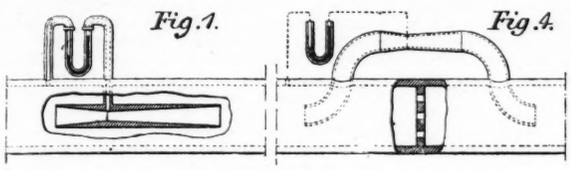
the gases so pass is limited by cups with overflow openings in their sides.

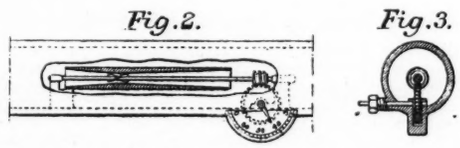
The gases then ascend through the material in the scrubber C, which is wetted by water issuing from a sprayer at the top. On reaching the top of the scrubber, the gases are drawn into the purifier D, containing material such as rusted iron turnings. The gases, on leaving the purifier D, pass up through the purifier E, containing matter such as vegetable moss, and thence into the blower F, which supplies the gases under pressure to the apparatus or place of utilization.

Meters for Measuring the Flow of Fluids.—Ferris, W., of South Milwaukee, U S.A. No. 10,980; May 25, 1905.

The object of this invention is to provide fluid meters with means whereby they will, with accuracy, register fluid passing through the meter conduit or tube, at a lower velocity than the minimum rate at which, with the present types of meters, "the flow can be registered with any approach to accuracy;" and it consists mainly in the application of a secondary passage to the main conduit conveying a fluid in condition of full flow—the secondary passage being so connected with the main conduit that a portion of the fluid will pass through it in accordance with well-known laws. The secondary passage is formed with a constricted portion, or throat, in such manner that the velocity of the fluid passing through it will exceed the velocity of flow in the main conduit at either the entrance to, or exit from, the secondary passage.

The invention further consists in certain conformations of the main conduit and secondary passage, and in certain arrangements of the secondary passage relatively to the main conduit, in order to obtain





the desired high velocity through the constricted portion or throat of the secondary passage with the least possible loss due to friction. It also consists in methods of applying measuring devices to the constricted portion in the secondary passage, and to some other point in the apparatus, or, in some cases, to the constricted portion or throat only, in such manner as to obtain accurate measurement of the total amount of fluid passing through the main conduit.

Fig. 1 is a side elevation illustrating a shunt tube and mercury gauge applied, in accordance with the invention, to a main tube (partly broken away) of uniform diameter. Fig. 2 is a similar view illustrating the direct application of a mechanical measuring apparatus to the shunt tube. Fig. 3 is a transverse section of fig. 2. Fig. 4 is a side elevation showing an arrangement of the shunt tube on the outside of a main tube like fig. 1.

APPLICATIONS FOR LETTERS PATENT.

25,707.—Hazlehurst, A. N., "Gas-engines." Dec. 11.
25,723.—Potter, W. G., "Inverted burners." Dec. 11.
25,783.—Tooley, G. W., "Hydraulic mains." Dec. 11.
25,786.—Willis, P. R. J., Gas-engines." A communication from C. J. & V. E. Moody. Dec. 12.
25,798.—Wallwork, R. & C. H., "Gas-irons." Dec. 12.
25,810.—Warry, J., and Arculus, G. N. & E. A., "Inverted fitting." Dec. 12.
25,821.—Hodges, T., "Gas-engines." Dec. 12.
25,855.—Betts, L., and the Improved Electric Supplies Company, Ltd., "Gas-radiators." Dec. 12.
25,888.—Potter, W. G., "Incandescent burners." Dec. 13.
25,926.—Day, P. J. C., and Wiesengrund, B., "Suction-gas producers." Dec. 13.
25,930.—Sproxton, K., "Inverted globe-holders." Dec. 13.
26,005.—Sugden, F. H., "Incandescent lighting." Dec. 14.
26,063.—Haute, D. V., "Gas-taps." Dec. 14.
26,108.—Harry, G. A., "Steatite mantle." Dec. 15.
26,158.—Thorn, A. W., "Acetylene purifier." Dec. 15.
26,179.—Humphrey, A. A., "Apparatus for the treatment of gas, water, and other liquids." Dec. 15.
26,185.—Sadtler, J. P. B., "Gas-burner." Dec. 15.
26,187.—J. Stone and Co., Ltd., and Darker, A. H., "Railway-carriage gas lighting." Dec. 15.
26,189.—Love, G. R., "Inclined retorts." Dec. 15.
26,209.—Gledhill, A. H., "Gas-engines." Dec. 16.
26,238.—Everdson, C., "Acetylene generators." Dec. 16.
26,262.—Feld, W., "Extracting ammonia from gas." Dec. 16.

The Sulphur Question at Tottenham.—The Tottenham Urban District Council had before them on Tuesday a report from the Gas Examiner to the effect that the results of his tests for sulphur were as follows: Nov. 23, 21·5 grains; Nov. 24, 20·3 grains; Nov. 25, 23·7 grains; Nov. 27, 24·3 grains; Nov. 28, 23·1 grains; Nov 29. 23·2 grains. It was decided, on the recommendation of the Public Health Committee, to institute proceedings against the Gas Company.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

(*Before Mr. Justice* Buckley.)

Wednesday, Dec. 20.

New Inverted Incandescent Gas-Lamp Company v. Cope and Timmins, Limited.

Judgment in this case (the proceedings in which have been reported in the last three issues of the "Journal") was delivered this morning. The plaintiffs, who are the proprietors of two patents (No. 5769 of 1900, granted to Josef Bernt and Emanuel Cervenka, and No. 265 of 1903, granted to Armand Farkas), sought to restrain the defendants from selling any incandescent burners made under these patents, or any burners only colorably differing therefrom. The defendants denied infringement, and alleged that the patents sued upon were invalid.

Justice Buckley said the plaintiffs sued on two patents—No. 5769 of 1900, and No. 265 of 1905. First as to the specification, patentees commenced with describing difficulties in the use of inverted incandescent burners. They said that when the burner was reversed the lighted gas issuing downwards struck-back to the open nozzle of the burner; and the greatest portion of the mantle did not come in contact with the burning gas at all. This meant that, in the case of a reversed or inverted burner, the heated products of combustion did not, as when the burner was erect, tend to rise away from the burning head, but tended to turn back upon and embrace the tube which ended in the burning head, with the result, as they said, that "the burner became excessively hot." To escape this difficulty, they said gas had been used under considerable pressure, but that they were going to show how to use it under normal pressure. The result of the mischief to which they pointed was, so they said, that a current of air was produced sufficiently strong to drive the flame back. The current of which they were speaking was obviously a current external to the burner at the place where the flame was, and was a current whose effect was mischievous by reason of the fact that it drove the flame back upon the burner-tube. Their invention, they said, related to a novel construction of bunsen burner—not, he would remark in passing, to a new position of the mantle with reference to the point at which the gas was ignited as it issued from the burner. It was a novel construction which could be used with ordinary gas pressure for inverted incandescent burners. The mischief indicated, and which the patent was going to escape, was that of the burner becoming excessively hot. The object of the combination which the patentees claimed was to ensure that the burner should not become excessively hot, but should be kept relatively cool. It was essential to bear in mind as the dominant idea of this patent that it was one whose object was to keep the burner cool. At this date—1900—many attempts had been made to achieve success with inverted incandescent burners; but all of them, with one exception (that of Kent), had been what were called regenerating burners—that was, burners in which the heat of combustion was used to increase the heat of the apparatus used, and of the gases which were caused to pass through it. The idea of these patentees was to abandon regeneration, and aim for coolness. To achieve this result, they described a particular combination having four, or not more than four, factors or characteristics—viz., first an isolator made of, preferably, bad heat-conducting material; secondly, such a position of the burner-head as that it should project into the mantle; thirdly, a wholly open orifice to the burner-head; and, fourthly, a deflector to keep the hot air away from the sides of the burner. Of these, the first, second, and fourth were found referred to in the first claim; while the third was not plainly—if, indeed, at all—there referred to. No. 265 of 1903 was another patent of which the dominant feature again was coolness. The overheating of the mixing-tube was to be prevented by surrounding the bunsen tube with another tube. The inner and the outer tubes were to be connected at the top, and were to communicate with the outer air only at the lower end. The result was to be that the imprisoned air would be considerably rarified by being heated, and was to form an excellent heat insulator. The claims were for a device for keeping cool the burner-tube by a projecting tube insulated from the burner-tube by a layer of air. Having thus described the two patents, he would next make some observations on the arguments addressed to him with reference to each of them. As to No. 5769, it was said, and no doubt with truth, that if the conduit-pipe in which the mixed gases were conveyed down to the burning head, which he would call the shaft, became excessively hot, the ratio of the air to gas in the mixture was affected, for the following reasons: The injector action of the bunsen nozzle was downwards; the excessively heated mixture in the shaft tended to rise upwards; and the injector action was thus met by a force in the contrary direction, which diminished its energy, and reduced the amount of air that would be drawn in through the port-holes. Upon this, he had only to say that he did not find that the patentees referred to it in any way in their specification. The current to which they alluded was an external current. Secondly, it was said that, if the products of combustion were allowed to pass through the port-holes, the steadiness of the flame at the burning head was affected, and that it was desirable to keep the products of combustion away from the port-holes. Upon this, again, he observed that the patentees said nothing about it in their specification. It was perfectly well known that it was desirable to keep the products o combustion away from the port-holes. The patentees had an arrangement which arrived at this result; but they made no claim, he thought, in this respect. The matter to which the patentees pointed was this: The mischief arising from the burner being excessively hot. This might be either by conduction (that was, by the heat generated at the burning head travelling upwards through the metal or material of which the shaft was composed) or by convection (that was, by the heat being carried up the sides of the shaft by reason of the flame

striking-back, as it was called). With the latter of these, it was certainly intended to grapple by the deflector, which was to keep the hot air away from the sides of the burner. With the former he had much more difficulty in saying that they grappled, or grappled effectually. He had the greatest difficulty in understanding what they meant by their "isolator." If the direction were to make it of some bad heat-conducting material, he could understand it—it would tend to stop the heat by conduction. But it was to be merely of preferably bad heat-conducting material. If they meant as part of their combination to claim as a patentable thing, under the head of an isolator, a tube made of an excellent conducting material, the word "isolator" and the patentable invention in that respect ceased to bear any meaning. With regard to No. 265, he made the following observations: When the inner tube of less circumference was surrounded by a jacketing tube of greater circumference, and, therefore greater metallic surface, any advantage gained by keeping the flame from the inner tube might be counterbalanced by the greater metallic surface of the outer tube; and if the outer tube were in perfect metallic contact with the inner tube, the effect of jacketing the inner tube (and he thought the result of the evidence), was that it was not to reduce, but if anything to increase, the heat of the inner tube. If the intervening stratum of air became under the action of heat highly rarified, it might be that, so far as that stratum was concerned, the patentee was right in saying that this would form an excellent heat insulator; but if the chamber was open at its upper end, one of the essential conditions of the problem was obviously removed. These being the patents, he would go on to consider whether the defendants had infringed them. The first alleged infringement was furnished with a jacketing-tube, not closed at the upper end, but containing holes and allowing the entrance and exit of air. It was furnished with, not a conical deflector with its apex downwards—such as patent No. 5769 described, but with what he might call an inverted cup with its apex upwards, forming an excellent pocket for receiving and holding the heated gases arising from the burning head. The result of this construction, upon the evidence, was that this arrangement did not keep cool the shaft through which the mixture was passing. The result of the jacketed-tube with the opening at the top was that the inner tube, so far from being kept cooler, was, in fact, rather hotter than if the jacket was removed. The inverted cup had some, but an inappreciable, effect by protecting from heat so much of the burner as lay above the bottom of the inverted cup. The whole being in metallic contact, even this small portion was not by the defendants' arrangement kept cooler. "VBL1," the alleged infringement, had not the jacket described in patent No. 265. for the jacket was open at the upper end; and if the jacket of patent No. 265 had (although he thought it had not) any effect in keeping the inner tube cooler, the defendants' jacket in "VBL1" had not. As regarded the existence in "VBL1" of an isolator, it was true that the words "isolator" and "conductor" were not mutally exclusive; for there was no material which had not some power of resistance to the conduction of heat, and which was not therefore in some sense an isolator. But the result of the evidence was that to call a brass tube an isolator in any sense, in the case of a patent for burning gas and air in a bunsen burner, was absurd. Brass was an ordinary conductor, and in no intelligible sense isolated the burning-head from anything, at the further end of a brass tube of so short a length as was here in question. If the word "isolator" in patent No. 5769 meant a metal tube made of the best, or of an exceedingly good conductor of heat, the patent must be bad. If it meant a thing which was stated and tended to keep cool, then the defendants had in "VBL1" no isolator. In his judgment, the defendants, in "VBL1," did not infringe; they neither kept the burner cool, nor, if they did in any sense keep it cool, did they adopt the plaintiffs' means of keeping it cool. The other alleged infringement—"VBL2"—had no jacket, nor, in the plaintiffs' sense, a deflector. The conduit-tube or shaft for some two-thirds of its lower end (the most important part for this purpose) was left freely exposed to the heated gases; and the alleged deflector could at most only protect the upper part. He could not appreciate what it was in that lamp which could be called an isolator. It was an ordinary bunsen burner, with a shaft of ordinary length, made of brass. At its upper part was an inverted cone similar to the plaintiffs' deflector, but in such a position that it could not have the effect for which the plaintiffs used it. It did not keep the burner cool. The tube was, in fact, shorter than it was in the Globe case, which Mr. Justice Joyce held not to infringe. Another point on which he had heard a good deal of evidence was as to the projection of the head into the mantle; but it was perfectly well known that, for a successful lamp, one must have a mantle to fit the flame; and, secondly, the patent indicated a mantle which did not, in fact, fit the flame, but was in a form which the plaintiffs had now abandoned. Further, the position of the mantle in reference to the burner-head was not a matter which the plaintiffs could, or did, claim a monopoly of. Having arrived at the conclusion that the defendants did not infringe, it was not necessary to decide the issue of validity. He would certify that the defendants' particulars of objection, so far as the specifications that had been referred to were concerned, were reasonable and proper. The action would be dismissed with costs.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

(*Before the* LORD CHIEF JUSTICE *and Justices* LAWRANCE *and* RIDLEY.)

Tuesday, Dec. 19.

The Assessment of the Liverpool Water-Mains.

To-day their Lordships had before them a special case stated in an appeal by the Corporation of Liverpool against the assessment of their property in the parish of Bidston-cum-Ford, in the Birkenhead Union. The appeal was originally heard, with two others, by Sir Horatio Lloyd at the Cheshire Quarter Sessions, on Oct. 20 last year, and was reported in the "JOURNAL" the following Tuesday (p. 271). The Corporation were then unsuccessful; and the Bench agreed to state a case.

Mr. DANCKWERTS, K.C., Mr. HORRIDGE, K.C., and Mr. F. E. SMITH appeared for the appellants; Mr. MARSHALL, K.C., Mr. PICKFORD, K.C., and Mr. ROSS BROWN for the Wallasey Urban District Council. The Birkenhead Union was not represented by Counsel.

Mr. HORRIDGE, in opening the proceedings, said the case had reference to the rating of a water-main; the question really being as to whether the Corporation of Liverpool or the Wallasey District Council should be rated. The main went through a number of parishes on the way from Lake Vyrnwy, and then served the district of Wallasey. The question really turned upon the construction of an agreement under which the Corporation agreed to supply Wallasey by this main. The contention of the Corporation was that they delivered the water at a point at the commencement of the main, and that the District Council took it and used it exclusively for their district. The Council said the pipe vested in the Corporation, and that the water did not pass to them until it had reached Wallasey at the end of the pipe. The Court of Quarter Sessions decided in favour of the Council. Whether or not the water was measured at Wallasey, his (Mr. Horridge's) contention was that, on the true construction of the agreement, the supply was at Hatchmere. The water passed through the pipe for the benefit of the Wallasey district, and that passing through, he submitted, was "occupation" within the meaning of the agreement.

Mr. MARSHALL was not called upon.

The LORD CHIEF JUSTICE said, in his opinion, the judgment of Sir Horatio Lloyd—a most experienced Chairman of Quarter Sessions—was right. The water was delivered into the pipe 20 miles from the Wallasey district. It passed through many parishes, and if anything occurred to the main, or if there was leakage, the loss would be that of the Liverpool Corporation. They were to be paid a certain sum for the water delivered to Wallasey. In his opinion, the Corporation were in the exclusive occupation of this pipe and of the hole in the ground in which it lay for the purpose of conveying the water they were selling to the Wallasey Council. The appeal, therefore, failed, and must be dismissed, with costs.

Justices LAWRANCE and RIDLEY concurred.

Water Supply to Electric Light Works.

In the Chancery Division of the High Court of Justice on the 15th inst., Mr. Justice Warrington had before him a case in which the Llanwrst Electricity Supply Company, Limited, claimed an injunction to restrain the Urban District Council from shutting off their water supply, or otherwise obstructing the flow of water, in such a way as to interfere with the plaintiffs' supply and prevent them carrying on their business properly. Mr. Hewitt and Mr. Farrer appeared for the plaintiffs; Mr. Rowden, K.C., and Mr. R. J. Parker represented the defendants. Mr. Hewitt said the Company was formed to supply electricity to Llanrwst and Trefriw; and they became lessees of old flour-mills on the banks of the River Crafnant. They required for their works a flow of water in the evening. Defendants, however, as the Sanitary Authority, had acquired the site of the lake from which the river ran; and they asserted that they had a right to control and prevent, at their will and pleasure, any water flowing down through certain pipes that had taken the place of a sluice-gate. Secondly, defendants said that plaintiffs never were entitled to a flow of water except in the daytime, ending at three o'clock in the afternoon, which was absolutely useless to the plaintiffs; and they denied the existence of any such custom. Thirdly, they said that compensation had been paid to the plaintiffs' predecessors, under an award, in complete satisfaction of all their water rights. Plaintiffs alleged that none of these contentions were correct. Mr. Rowden, for the defence, contended that, on the documents of title, the plaintiffs had no right to the quantity of water they demanded. Whatever rights they had on the documents, the whole matter was changed in 1897, because they then erected a turbine, which had greatly increased the burden of supply. If plaintiffs had all the water they wanted at any time from the stream, the result would be that many other people who were entitled to share in it would be almost entirely deprived of a supply. Mr. T. B. Farrington, an engineer with considerable experience of water-works in North Wales, gave evidence as to the basis on which compensation was awarded to the plaintiffs' predecessors, when the defendants constructed their water-works. Next day, further evidence was given for the plaintiffs. Mr. Rowden then submitted that they had not made out any claim to a continuous supply of water by day and by night. Mr. Hewitt contended the contrary. Without hearing the defendants' evidence, his Lordship gave judgment. He said the particular right which the plaintiffs insisted upon was to have water from the lake flow through certain pipes at all times necessary for working the plant on the premises demised to them. This meant that they insisted on having a flow of water at night. Putting it in other terms, what they asserted was a right to have water flow through these pipes during such hours as they might themselves select for their own convenience. Was that right made out? In his opinion it was not. There must therefore be judgment for the defendants, with costs.

Putting Checks into a Prepayment Gas-Meter.

In the Dundee Police Court, on Monday last week, before Bailie Foreman, James Williamson, labourer, residing in Castle Street, Dundee, was charged with having, between the 9th of October and the 13th of December, stolen two pennyworth of gas, by placing metal discs in a prepayment meter. Williamson said he did not think he was guilty of theft. It was a common practice, when people had no money, to put checks into the meter, and when the inspector came round, the checks were counted and a similar number of pence was paid to him. Bailie Foreman said he could understand a man not having a penny and putting in a check, with the intention of paying the penny. He would be dismissed on the understanding that it would be a warning to him and to similar consumers of gas.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

The Introduction of the Telescopic Gasholder.

SIR,—On reading the paragraph in the current "JOURNAL" on the above subject, I referred to an old manuscript record, compiled by my late father, of the transactions of the Salford Corporation Lighting Committee. From this, I find that on March 4, 1846, the Committee "appointed a Sub-Committee to obtain, conjointly with Mr. Stelfox, further information from Liverpool, Preston, and some other places, regarding the expense, erection, working, &c., of telescopic gasholders." The Committee handed in their report the following week.

The report, though interesting, would be too long for your columns; and, I therefore, append a few extracts. They had an interview with the late Mr. Alfred King, of Liverpool, to whom certain questions were submitted, one of which was as to "the use and safety of working such gasholders, when 80 and 100 feet diameter, as compared with those of 50 and 60 feet diameter." Mr. King "gave very satisfactory answers as to the superiority of the telescope over the other," and "informed the deputation that it was his intention to erect two more in addition to five already at work."

They then proceeded to the new works; and in the absence of Mr. H. Steel, the Engineer, they were informed by Mr. Callow that this Company "gave a decided preference to the telescope." My father subsequently paid a visit to Preston, and "had a conference with Mr. Rofe, the Engineer of the gas-works there." Mr. Rofe stated that he "has four telescopes, is erecting another, and has space for the erection of three more." His sentiments were entirely in favour of telescopes, "and he speaks from six years experience as to their advantages."

This therefore takes us back to the year 1840, when telescopic gasholders seem to have been introduced into Preston.

Belfast, Dec. 20, 1905. JAMES STELFOX.

The New Test Burner.

SIR,—If there is one question more important than others to the interests of gas companies, it is possibly that of the standard burner to be used for the official regulation of prescribed illuminating power; and I may have something further to say about this matter shortly.

It is obvious that, given a required 5 feet consumption, and one burner for all grades of gas, there is only one course open—viz., the regulation of the air supply. There is nothing novel in the arrangement of the screen-disc. It has been in use in Holland for some considerable period.

The pertinent question at the present time—and on which, as far as I know, there is no definite information—is: How is the position of the disc to be regulated? It would be altogether too incongruous to leave it to the discretion of all sorts and conditions of gas-testers. Some definite prescription must, therefore, be made by the Gas Referees, adaptable to various grades of gas, and information on this subject is at present wanting.

Catford, Dec. 21, 1905. H. LEICESTER GREVILLE, F.I.C., F.C.S.

The Salaries Question.

SIR,—As one of the "Juniors," I should like to thank "The Professional Man" for his protest against the iniquitously low salaries offered to assistant engineers in the majority of places. And may I include, in supporting this protest, many of the chief engineerships.

I am living in the hope that the Institution of Gas Engineers will soon take up this matter. It is one of vital importance to the profession; and if something is not done, the profession will deteriorate, instead of rising in efficiency and scientific equipment.

Why should a man of brains waste his powers for such miserable pittances as are so often offered? I have heard of a councillor (Municipalities are the worst offenders) who, when asked why his Committee offered such a low salary, replied: "Oh, we shall have plenty of applicants." Quite so. The world is full of people ready to improve their position. But what of the quality of the men who are so anxious to obtain positions at far below their value? Men of real ability are getting disgusted; and, as I say, the profession is suffering by it.

In settling many of these appointments, the Boards, or it is more usually the Committees, send round to find out what other concerns of a similar size are paying their men. What on earth has this to do with the value of the right man to them? Let them offer a good sum and get a good man, and increase his salary according to results. The salary-list of other undertakings does not affect the results of their own concern.

Good results and salaries ought to rise together. No man can do his best without encouragement, and recognition of his services. Cannot the authorities see that by offering such low remuneration they are raking in the scum of the profession, and repelling men of real worth; and cannot they see that, by spending a few hundreds in salaries, they save thousands through efficiency?

Many of them cling to the old, narrow notion that, if a man can scramble along without any serious blunders, and if the dividends are paid or the rates "relieved," that is good management! Do they forget the competition of electricity, which may at any time, by means of new inventions, overstride gas once more? Surely the best hope for the future of our industry is in being ready to meet all possibilities, and to be on in front, right out of reach? This cannot be done by stifling all incentive to benefit the profession by small salaries. Let the authorities pay good prices, so as to encourage men of first-class ability to enter the profession. Such men are wanted now, and will be more wanted as time goes on.

You, Sir, have done much in bringing this complaint into notice, and our thanks, which you have always had, will be further offered if you will follow up the letter of "The Professional Man," and again use your great influence in the "JOURNAL."

Dec. 22, 1905. ONE OF THE UNDER-PAID.

Gas-Radiators and the Smoke Abatement Exhibition.

SIR,—We had hoped to have an opportunity of writing you in time for the last number of the "JOURNAL" with reference to your remarks in the issue for the 12th inst. regarding the exclusion of gas-radiators from the Smoke Abatement Exhibition. We may say that we were under the necessity, at the last moment, of abandoning our intention of exhibiting, and allowing our space at the exhibition to go unoccupied, for the reason that our only purpose in exhibiting had been to show our various types of flueless gas-radiators, and that we found that, notwithstanding our strong representations to the management of the exhibition, both in writing and by personal call, they still adhered to their resolution not to admit flueless gas-stoves.

We quite agree with your view that the action of the management in this matter was fitted to give an undue advantage to the makers of electric heating apparatus. In view of the strong position which the gas-radiator business now holds, and of the still stronger position which it gives every promise of occupying in the near future, and in the face of the excellent results, as to the effect on the atmosphere of a room, obtained with a gas-radiator of our make, in searching chemical tests by the Chief Government Chemist, reported a year or two ago in the columns of the "JOURNAL," we cannot but think that the time has come when the Smoke Abatement Exhibition authorities should take the trouble to acquaint themselves with what has been happening during the last year or two in the gas-heating industry, instead of adhering rigidly to a rule which was made in earlier days, and under totally different conditions from those which have now developed. To fail in appreciating the new conditions, and adapting their methods to suit them, would necessarily involve the stultifying, to that extent, of the very objects which these exhibitions are intended to promote. However desirable caution and circumspection may have been some years ago, when this class of apparatus was in its infancy, it seems to us that the public will naturally expect rather to find this organization in the van of progress than allowing obsolete regulations to put needless difficulties in the way.

Birmingham, Dec. 20, 1905. JOHN WRIGHT AND CO.

PARLIAMENTARY INTELLIGENCE.

PROJECTED GAS LEGISLATION FOR NEXT SESSION.

As Saturday, the 16th inst., was the last day for the deposit of prints of Bills in the Private Bill Office, we are able, by the courtesy of the various Parliamentary Agents, to give a fuller indication of the scope of some of the measures prepared for next session than we were in a position to do from the "Gazette" notices which appeared last month.

Proposed Purchases of Gas-Works.

The Corporation of Aberystwyth have promoted a Bill to empower them to purchase the undertaking of the Aberystwyth Gas Company, and supply gas within the borough and certain townships. According to the purchase clause, the Corporation are to give the Company notice, within three months after the passing of the Act, of their intention to acquire the property; and the price to be paid, if not agreed upon, is to be determined by arbitration under the Lands Clauses Acts, and no allowance is to be made for compulsory sale. The purchase is to be completed on a date to be named, or on the 1st of January or the 1st of July next after the expiration of two months from the determination of the amount of the purchase-money. Until the transfer actually takes place, the Company are to carry on the undertaking. The limits of supply are to be the borough and three townships in the parish of Llanbadarnfawr, in the county of Cardigan. The price to be charged by the Corporation for gas is not to exceed 4s. 3d. per 1000 cubic feet; but they may allow discounts or rebates for prompt payment. The quality of the gas is to be not less than 14 candles, as tested by Sugg's "London" argand burner No. 1, "or any other burner approved for this purpose by the Board of Trade, upon the application of the Corporation;" and in making the test the gas is to be burnt at such a rate as to give a light equal to 16 candles. The Bill confers various powers upon the Corporation in regard to the placing of pipes between their mains and the consumers' meters; and it authorizes them to supply gas appliances and engines for heating, motive power, and other purposes. The Corporation may, with the consent of parties specially interested, supply gas in bulk beyond their limits. They ask for authority to borrow for purchasing the undertaking and defraying the incidental costs and expenses, such sum or sums as may be required; for the extension and improvement of the works, £21,000; and for working capital, £3000. They ask for 45 years from the date of borrowing in which to repay the purchase price, 30 years for money raised for extensions, and 10 years for the working capital. Among the miscellaneous clauses of the Bill is one sanctioning the erection and maintenance of dwelling-houses for the gas-works employees.

The Hitchin Urban District Council are applying for authority to purchase the undertaking of the Hitchin and District Gas Company, and supply gas. The period fixed for giving notice by the Council is three months after the passing of the Act; and failing agreement as to price, it is to be settled by arbitration. In this event, 10 per cent. is to be allowed as compensation for compulsory purchase. In settling

the amount to be paid to the Company, no consideration is to be given to the fact that they obtained their Act of last session; but they are to be allowed the costs incurred in connection with it, as well as the expenses incidental to winding up the concern. The limits of supply are to be the urban district of Hitchin and parts of certain parishes in the rural district comprised within a circle having a radius of two miles from the centre of the Hitchin Market Place. The Council ask for power to maintain and continue the existing works and erect others. Provision is made for the protection of the Hertfordshire County Council and the Great Northern Railway Company. The price of gas is not to exceed 3s. 6d. and 4s. per 1000 feet, nor its illuminating power to be less than 14 candles, as tested by Sugg's "London" argand burner No. 1, with a 6 in. by 1¾ in. glass chimney; but it is provided that "if at any time, and so long as, the gas-flame rises above the top of the glass," a 6 in. by 2 in. chimney is to be used, "or any other burner or chimney approved for this purpose by the Board of Trade on the application of the Council." Provision is made for the supply by the Council of fittings, &c., for heating and other purposes, as well as for the sale of portions of the gas-works. The Council ask for power to borrow such sums as may be required for the purchase of the undertaking. As in the case of Aberystwyth, the Council wish to have authority to erect and maintain dwelling-houses for the persons employed in the gas-works.

The Bill promoted by the Pontefract Corporation is another to sanction (*inter alia*) the purchase of the local gas undertaking on the conditions as to notice indicated in the two Bills already dealt with. Should arbitration be necessary to fix the amount of the purchase-money, it is to be conducted by a single arbitrator, who is to have brought before him, by one counsel on either side, one engineer and one accountant as expert witnesses, in addition to any officers in the regular employment of the parties. The proposed limits of supply are the borough of Pontefract and the parish of Carleton, in the West Riding of the county of York. The price of gas is not to exceed 5s. 6d. per 1000 cubic feet; and its illuminating power is to be not less than 14 candles. Within six months from the passing of the Act, a testing-place is to be provided "at some convenient part of the gas-works;" and the test-burner prescribed is a 24-hole argand, or such other as the Board of Trade shall approve on the application of the Corporation. The Bill contains the usual authority to supply fittings for heating and other purposes. The Corporation require power to borrow whatever sum may be necessary for the purchase of the undertaking, and £6000 for gas-works purposes generally, to be repaid within 50 years from the date or dates of borrowing. The accounts of the gas undertaking are to be kept separate.

The Wolstanton United Urban District Council have promoted a Bill to confirm an agreement, dated the 4th inst., made between them and the Chesterton Gas Company, Limited, for the purchase of their works and business, and to sanction the acquisition of so much of the mains, pipes, and other works of the Corporations of Burslem and Newcastle-under-Lyme respectively as are within the district of the Council. Provision is made for the dissolution and winding up of the Company. The Council require power to continue and maintain gas-works, and to purchase by agreement lands for gas purposes; and they undertake not to manufacture gas except on the scheduled lands. The maximum price of gas is 4s. per 1000 cubic feet, and its illuminating power is to be 14 candles. There is to be a testing-place at the works; and the table photometer, Harcourt's 10-candle pentane lamp, and the "Wandsworth" burner, with 6 in. by 1⅛ in. chimney, are to be used. The Council ask for power both to supply and purchase gas in bulk. They also wish to borrow for the purchase of the Company's works and business £2600; for the acquisition of the plant of the two Corporations named, such sums as may be requisite; for the extension and improvement of the gas-works, £25,000; and for working capital, £2000. For the repayment of the first two amounts they ask for a period of 35 years from the date or dates of borrowing; for the third and fourth, 30 years and 10 years respectively. This Bill also contains a clause to empower the Council to erect and maintain dwelling-houses for persons employed in their gas undertaking.

Illuminating Power aad Sulphur Provisions.

The Cheltenham Gas Company have promoted a Bill to obtain further powers. They desire to extend their limits of supply so as to include Southam (otherwise Southam and Brockhampton), Woodmancote, and Bishop's Cleeve, in Gloucestershire; and to have the illuminating power of their gas fixed at 14 candles, on an average of three consecutive tests taken in one day, between the hours prescribed by section 29 of the Gas-Works Clauses Act, 1871. The clause describing the test-burner is as follows:—

> The burner to be used for testing the illuminating power of the gas, and the chimney (if any) to be used with such burner, shall be the Metropolitan argand burner No. 2, or such other burner and chimney (if any) as may be for the time being prescribed by the Referees under the City of London Gas Act, 1868, for testing the illuminating power of gas of the quality of 14 candles supplied by any of the London Gas Companies; and in making any test of the gas supplied by the Company, the burner shall be used in such a manner as to obtain from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light, and in accordance with any directions of the said Gas Referees for the time being in force relating to the method of using the said Metropolitan argand burner No, 2, or such other burner and chimney (if any) as aforesaid.

The lamp is to be the 10-candle pentane.

The Derby Gas Company are applying for authority to extend their limits of supply so as to include several neighbouring parishes and places; and to acquire the undertakings of the Spondon, Ockbrook, and Borrowash Gas Company and the Mickleover and Etwall Gas Company. Power is sought to construct and maintain gas-works; and the Company desire to be exempt from liability to penalty or forfeiture "by reason of the presence in the gas of the Company of sulphur impurities other than sulphuretted hydrogen."

The South Suburban Gas Company's Bill makes further provisions with respect to the gas to be supplied by them and the price to be charged for it. The preamble sets forth that by the Company's Act of 1873 the gas was to be of 14-candle power, as tested by Sugg's "London" argand burner No. 1, consuming 5 cubic feet of gas per hour with a 6 in. by 1¾ in. chimney; that by their Act of 1893 the illuminating power was to be 15 candles, and the burner Sugg's "London" 16-candle argand No. 1; that by their Act of 1904 the standard price of gas was fixed at 3s. 2d. per 1000 cubic feet; and that it is expedient that the illuminating power and price of gas should be altered, and that the burner to be prescribed should be substituted for the one named in the Act of 1893. By clause 2 the standard price is reduced by 2d.; and by clause 3 the illuminating power of the gas is fixed at 13 candles. The following is the portion of the clause referring to the burner:—

> The prescribed burner shall be the burner known as "Carpenter's Metropolitan argand No. 2 burner," prescribed under the provisions of the London Gas Act, 1905, or such other burner as may be from time to time prescribed under that Act, and as may comply with the conditions in the said Act contained; that is to say, that such other burner shall be of such a pattern (not being an incandescent or similar burner) as shall be practicable for use by the consumer, and shall, with the chimney (if any) to be used therewith, be the most suitable for obtaining from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light. In testing the illuminating power of the gas supplied by the Company, the said Carpenter's Metropolitan argand No. 2 burner, or any such other burner and chimney as may be hereafter prescribed as aforesaid, shall be so used as to obtain from the gas, when consumed at the rate aforesaid, the greatest amount of light.

The standard is to be the Harcourt 10-candle pentane; and the gas under examination is to be kept burning at the rate of 5 cubic feet an hour for at least 30 minutes before any test is made. It is specified that in testing the illuminating power of the gas it is not to be necessary to apply more than a single test.

The Tottenham and Edmonton Gas Company are applying for further powers. They propose to construct new works, the nature of which was indicated in the abstract of the parliamentary notice which appeared in the "JOURNAL" on the 28th ult., and will be referred to again when the whole of the Gas Bills for the coming session are dealt with. It is sufficient here to mention that the Company wish to be authorized to supply, by agreement, the occupier of any premises within their limits with gas to be utilized as power; and it is proposed that the provisions of sections 11 and 12, 24 to 34, 36 and 37 of the Gas-Works Clauses Act, 1871, and those relating to the illuminating power or purity of the gas and the testing thereof, shall be inapplicable in respect of gas so supplied or to the Company, who, however, are not to sell this gas for lighting purposes. With regard to the illuminating power and purity of their ordinary gas, it is proposed to ask for the repeal of section 27 of the Company's Act of 1898, and fix the illuminating power at 14 candles, to employ in testing it the table photometer, and to use the Harcourt 10-candle pentane lamp instead of candles. The prescribed burner is to be of such a pattern (not being an incandescent or similar burner) as shall be "practicable for use by the consumer;" and the burner and chimney (if any) are to be "the most suitable for obtaining, and in making the test shall be so used as to obtain, from the gas the greatest amount of light." The portion of the Bill dealing with these matters contains a clause to the effect that the Company are not to be liable to any penalty or forfeiture by reason of the presence in their gas of sulphur impurities other than sulphuretted hydrogen.

Although joining the other Companies in promoting the Gas Companies (Removal of Sulphur Restrictions) Bill, the Wandsworth and Putney Gas Company have a short Bill of their own to repeal the sections of their Act of 1900 imposing sulphur restrictions. As in the case of the Joint Bill, which has been fully noticed (*ante*, p. 673), the preamble contains the long extract on this subject from the report of the Departmental Committee, and then sets forth that, inasmuch as the Metropolitan Gas Companies have, by virtue of the London Gas Act of last session, and the South Suburban Gas Company by their Act of the same session, been severally relieved of liability to forfeiture for sulphur impurities, it is expedient that the Wandsworth Company also should be granted similar relief. The Bill itself contains only three clauses. The first gives the short title of the proposed Act; the second repeals the special sections of the Company's Act of 1900 bearing upon sulphur in the gas; and the third provides for the payment by the Company of all the costs, charges, and expenses incident to preparing and passing the Act.

The other Bills will be noticed in the usual articles dealing with the general legislative proposals for next session.

The Discharge of Coal Cargoes for the Devonport Gas-Works.—A scheme for improving the method of, and reducing the cost of, discharging coal for use at the Devonport Gas-Works is under the consideration of some of the Committees of the Corporation. Though Devonport has a river frontage of several miles, so much of it is monopolized by Government establishments, that there are only two or three points at which material of any kind for either municipal or private use can be landed. At present, the coal for the gas-works is discharged at Tamar Wharf; and the methods are so primitive and inadequate, that the cost is somewhere about 1s. per ton. Mr. J. W. Buckley, the Gas Manager, has suggested that the ships should come to Pottery Quay, which is owned by the Corporation, and that provision should be made for the use of grabs for unloading the vessels. It is calculated that by the adoption of adequate appliances, the cost of discharging the vessels may be reduced by one-half, and a saving of £500 a year effected. During the discussion of the matter by a Joint Committee of the Council last week, doubt was expressed as to whether the accommodation at Pottery Quay would be inadequate for its present use and for the unloading of coal cargoes; and it was contended that alterations would be required which would necessitate a capital expenditure of £5400. Before coming to a decision on the matter, the Joint Committee suggested that the Gas Committee should confer with the owner of Tamar Wharf, where the coal is now landed; and this will be done.

MISCELLANEOUS NEWS.

RATES AND GAS, ELECTRICITY, AND WATER CHARGES.

We have received from Mr. James Carter, the Borough Treasurer of Preston, a copy of his tabulated statistics of the rates levied and collected, and the charges made for gas, electricity, and water, in a number of Provincial towns and a few Metropolitan boroughs, for the year 1905-6. There are in all 89 places referred to—one more than on the last occasion; the newcomer being Walsall. The populations range from 730,143 (Liverpool) down to 20,288 (King's Lynn). The rateable values are highest in Westminster (£5,687,710), Liverpool (£4,470,837), and Manchester (4,083,119); and lowest in Bacup (£81,611), King's Lynn (£84,619), Brighouse (£87,889), and Stafford (£88,762). The places most heavily rated are: West Ham, 10s. 8d.; East Ham, 10s. 4d.; Norwich, 9s. 10d.; Ashton-under-Lyne, 9s. 5¼d.; Wolverhampton, 9s. 5d.; Dewsbury, 9s. 4d.; Rotherham, 9s. 2d.; Wakefield, 9s. od.; and Middlesbrough, 9s. od. Those which have the lightest rates are: Oxford, 4s. 7d.; Bournemouth, 5s. od.; and Lancaster, 5s. od. Out of the rents of property and profits transferred from municipal undertakings, the rates are reduced in the following towns to the extent named: Dewsbury, 1s. 9d. in the pound; Carlisle, 1s. 8d.; Darlington, 1s. 4½d.; Macclesfield, 1s. 3½d.; Rochdale, 1s. 3½d.; Bolton, 1s. 2¾d.; Nottingham, 1s. 1¾d.; Leicester, 1s. 1d.; Blackpool, 1s. 0⅝d.; Southport, 1s. 0⅜d.; Nelson, 1s. 0⅛d.; and Stafford, 1s. 0 1/10d. Bournemouth relieves the rates to the extent of ⅛d. in the pound; South Shields contributes ¼d.; Bootle, ⅜d.; and West Hartlepool, ¾d.

Coming to the table giving the charges for gas and water, we find that the price of the former is once more highest at King's Lynn—3s. 6d. per 1000 cubic feet; and Widnes is again lowest—the charge being 1s. 4d. per 1000 feet (while there is, of course, an even lower rate for very large consumers and engines). The following towns also enjoy the privilege of a gas supply at 2s. od. or less per 1000 cubic feet: Plymouth, 1s. 9d.; Gateshead, 1s. 9⅜d.; Bristol, 1s. 11d.; Bury, 1s. 11d.; Sunderland, 1s. 11d.; Belfast, 2s. od.; Darlington, 2s. od.; Lancaster, 2s. od.; Newcastle, 2s. od.; and Stockton-on-Tees, 2s. od. The maximum charge per Board of Trade unit for electricity ranges from 8d. at Devonport down to 3½d. at Ashton-under-Lyne, Burnley, and Salford. The charge for water for domestic purposes on a house of £15 rateable value is highest at Bury, Heywood, Rochdale, and Rotherham—2s. od. in the pound. It is lowest in the following towns: Bootle, 4¾d.; Liverpool, 4¾d.; Manchester, 8d.; King's Lynn, 8¼d.; Brighton, 9d.; Leamington, 9d.; Kensington, 9½d.; and Islington, 9⅝d. The other places in which the charges are less than 1s. are Birkenhead, Bournemouth, Oxford, Plymouth, Reading, Salford, Widnes, and York. At Preston (Mr. Carter's own town), the local rates are 8s. 10d. in the pound; and they are relieved to the extent of 7d. by the rents of property and the profits transferred from the gas, water, and other undertakings. The price of gas is 2s. 11½d. per 1000 cubic feet; of electricity, 7d. per unit; and of water, 1s. 2d. in the pound on £15 houses. Mr. Carter has this year again included a third table, showing the amount estimated for the current year to be transferred to the borough, district, or other fund from profitable undertakings, and the amount in the pound by which the rates are reduced in consequence.

PUBLIC LIGHTING OF NEWCASTLE-ON-TYNE.

An Extension of Electricity Recommended.

In the "JOURNAL" for Oct. 31 last, there appeared an offer made by the Newcastle-upon-Tyne and Gateshead Gas Company in opposition to a proposal to light certain streets by electricity; and the following week we published the reply of Mr. Ernest Hatton (the Tramways Engineer and Manager) to the Gas Company's arguments. Before the receipt of the Gas Company's offer, the Watch Committee had submitted a report to the City Council in which they recommended the adoption of electricity; but Mr. Thomas Waddom, the Secretary of the Company, has pointed out that since the date of this report the conditions have materially altered. The report was based upon an extension of 160 lamps, whereas the proposal now is to erect 180; the revenue per electric lamp was calcutated at £12, while it is now £11; and while the gas-lamps were calculated to cost £4 1s. 9d., the cost is now £3 5s. 6d. Mr. Waddom therefore submits that the estimated net gain to the ratepayers in favour of electric lamps, as shown in the report, would, in consequence of the altered circumstances, be changed into a loss of some hundreds of pounds. He also contends that, in all fairness, in making a comparison of cost, the two sources from which the light may be obtained should be based on an equal number of hours. In a report just issued to the members of the Council, the Committee intimate that they have carefully considered the subject, and have decided to adhere to the decision previously come to. They will therefore again present the report already submitted to the Council, recommending that the streets named should be lighted by electricity. The report is in the following terms.

The Watch Committee have had under consideration the desirability of extending the electric lighting of public streets in the city; and are pleased to be able to inform the Council that the price at which the Tramways Committee have now undertaken to carry out the work is such as to warrant the Committee in recommending the Council to make a large addition to the number of electric lamps. At the present time there are 200 lamps supplied with electricity from the tramway power station, at an annual cost of £15 10s. per lamp; this price covering not only the cost of the current and all maintenance charges, but also the amount required annually for the interest and redemption of the £10,000 which was borrowed to defray the capital expenditure on lamps, fittings, &c. The Watch Committee have, by arrangement with the Gas Company, fitted about 3500 lamps with incandescent burners, and in several of the main thoroughfares have fixed about 650 self-intensifying gas-burners to lamps, with very satisfactory results; and they were about to extend the latter system to the streets named in this report, when they were informed that the Tramways Committee were now able to supply electricity for lighting purposes at much less cost than hitherto. The Watch Committee accordingly approached the Tramways Committee to ascertain what charge they would make for an additional 160 electric lamps of similar power to the 200 in use. The Tramways Committee have resolved to charge the Watch Committee £11 per lamp per annum for each of the 200 existing lamps and the proposed additional 160 lamps, and suggest that the Watch Committee should, as early as possible, increase the number of electric lamps to a total of 500. This proposed charge of £11 per lamp is to cover not only the supply of electricity and the whole of the maintenance charges, but also the interest and redemption of all capital expenditure.

The Watch Committee propose, subject to the approval of the Council, to accept this offer, and to give orders for 180 electric lamps to be affixed to tramway poles in the following streets: North Road, 59 lamps; Osborne Road, 45; Jesmond Road, 36; Gallowgate, 11; Barrack Road, 10; Market Street, 12; additional lamps to complete circuits, 7—total, 180 lamps, which will, at an average of 700 candles each, give a total illuminating power of 126,000 standard candles, and will cost £1980 per annum, for all expenses, including the amount required annually for the interest and redemption of £4500, the estimated capital expenditure on lamps, fittings, &c. The reduction in the cost of the 200 existing lamps will, under the new arrangement, if approved by the Council, amount to £900 per annum. When the application was submitted to the Tramways Committee, it was intended to light North Road with electric lamps only as far as Forsyth Road; but the Watch Committee, having reconsidered the matter, decided to extend the electric lighting to the city boundary at Gosforth, and have increased the number of electric lamps from 160 to 180 to enable this to be done. The Committee will, in due course, carefully consider the suggestion of the Tramways Committee that the number of electric lamps should be increased to a total of 500.

To efficiently light the streets named in this report by gas would require the provision of 206 self-intensifying lamps, which would give an illuminating power of 61,800 standard candles, and cost £841 per annum. The Committee recommend the Council to sanction the proposal to light the streets named by electricity; and that the Council seal a memorial to the Local Government Board for sanction to borrow £4500 to defray the necessary capital expenditure.

At their meeting last Tuesday, the City Lighting Committee had presented to them the report of the Lamp Inspector (Mr. George Lamb) relating to the estimate for street lighting for the year ending March, 1907. The estimated cost for gas lighting, maintenance, &c., was £21,954, as against an estimated expenditure of £21,867 for the year ending March 31, 1906. The estimated cost of electric lighting was £4583 for the year 1906-7, as against £4490 for the current year. The estimate provides for 9318 gas-lamps and 650 electric lights. The report will be forwarded to the City Council for adoption.

INCANDESCENT GAS v. ELECTRICITY IN ISLINGTON.

An Attempt to Re-introduce Arc Lighting.

At the last Meeting of the Islington Borough Council, the Lighting Committee presented a report recommending that the arc lighting should be extended to 15 miles of streets at present lit by 714 incandescent gas-lamps. These it was proposed to supersede by 245 arc lamps, at a cost of £21,011. The present cost of gas supplied to the streets in question is £2361 per annum; and the Electrical Engineer (Mr. A. Gay) estimated that the total cost of the arc lamps proposed to be erected would be £2345 a year; showing a saving of £16.

Mr. VORLEY, in moving the adoption of the report, said there were some who objected to the scheme on the ground that the City of London and other places were adopting high-pressure gas. This argument he characterized as unsound and rather irritating, and said it was a case of harking-back to the time of monopolies.

Alderman ELLIOTT moved, as an amendment, that the question be referred to a Special Committee, consisting of the members of the Lighting and Finance Committees. He said the last-named Committee, which comprised some of the best business men on the Council, had reported adversely to the proposal, and had recommended that they should not sanction the large capital expenditure suggested. He contended that electric lighting had never been of any benefit to the borough. When he joined the Vestry, in 1875, the lighting rate was something like ½d. in the pound per half year; but it had now increased to just under 5d. Had they a *quid pro quo?* Had they an improvement corresponding to the tenfold increase in the rate? He had no hesitation in saying that the electric light itself was an absolute failure. A gentleman said to him the previous evening: "Why don't you people on the Council look to the lighting of the streets? We are half the time in darkness at Highbury, for the lights bob in and out like farthing rush-lights." This was what they had for their money. He wanted the matter to be sent to the Special Committee, who would go carefully into it, and give them a report which would put the question fairly and squarely before the ratepayers.

Mr. CRALE-REES, in seconding the amendment, ridiculed the statement that by substituting electric light for gas a saving of £16 per annum would be effected, and said that in times of fog it was impossible to tell whether an electric light was on until one got up to it.

Mr. DOVE, as representing Crouch Hill, asked that this district should be excluded from the places scheduled for arc lighting. The residents would rather keep the incandescent gas they now had. He characterized the scheme as a fad of the Committee, who wished to do away with incandescent gas and give the ratepayers something which nobody wanted.

Mr. E. S. SMITH remarked that at the election two years ago he advocated the extension of the electric lighting whenever and wherever it was possible to do so; and everybody who heard him appeared to endorse the sentiment.

Mr. DOVE: That was before we had incandescent gas.

After some further discussion, the amendment was put and carried by a large majority.

Mr. COOK moved that it be an instruction to the Special Committee not to meet until after the accounts of the electric light undertaking for the year ending March, 1906, had been published. He said that though he was an advocate of municipal trading, he did not agree with it when it was bad. The Council evidently had not fully grasped the fact that in March last the capital outlay on the electric light undertaking was £410,000. Since that date there had been expenditure which brought the total up to £436,000. They paid back £6356 of the capital last year; and at this rate it would be 60 years before it was all repaid. Apart from the financial aspect of the case, the Council had to consider the fact that in some localities gas was superseding electricity. Experiments had proved that gas would, in all probability, be the street illuminant of the future. Even some municipalities owning electric light undertakings were substituting gas for electricity in the streets.

Alderman SMALLWOOD, in supporting the amendment, said he had that evening, in Highbury Park, which was lighted by incandescent gas, taken the trouble to stand midway between two lamp-columns, and had there been able to read a full page of his *agenda*. He found he could see quite as well by the incandescent gas-light as he could by the electric arc lamps; and one cost something like £60 per annum, while the other cost £9 10s. The figures presented in favour of the proposed scheme were palpably and ridiculously wrong. They were simply a juggle; and he did not understand why they should be put before business men as facts. He did not believe in the electric light undertaking. It had been a failure from the very start; and he was convinced that more than half the assets standing to the account of the undertaking would have to be written off.

Mr. LEMON adversely criticized the scheme from the financial point of view.

Mr. Cook's proposition was then put and negatived. Consequently, in accordance with the previous amendment, the matter will be considered by a Special Committee consisting of the Lighting and Finance Committees.

SUPPLY OF ELECTRIC POWER IN LONDON.

The St. Neots Scheme.

In the notice of the several electrical power schemes for which parliamentary sanction is to be sought next session contained in the "Electric Lighting Memoranda" in the "JOURNAL" for the 28th ult., an indication was given of the nature of the project for the supply of London with power from a generating station at St. Neots; the current to be transmitted at high pressure along a private right-of-way, and then distributed to consumers in bulk along wayleaves obtained from the canal and railway companies, by which means the promoters believe that every part of the Metropolis can be reached without opening the streets or coming into competition with the Local Authorities. As already mentioned, the scheme has the support of the Great Northern Railway Company; and it is stated that provisional contracts have so far been made with several of the London Power Companies and local Councils. The fundamental idea of the new scheme is concentration. The seventy existing electric authorities, with nearly the same number of generating stations, are unable to meet the growing demand for electricity, and cannot extend their operations except at a ruinous cost.

In order to avoid the high rates of London and the greater cost of fuel, the promoters of the new scheme propose, as stated above, to establish their generating station at St. Neots, on land belonging to the Great Northern Railway Company—a spot which calculations show to be more economically situated with regard to London than any other place, having regard to the cheapness of coal and the cost of transmitting electricity. St. Neots is 51½ miles from King's Cross, and arrangements have been made for the delivery of coal at the generating station at a maximum inclusive cost of 7s. per ton, through the use of special means of hauling and handling. It is estimated that the saving in rates alone, as compared with a similar station in London, after making allowance for the rating of the wayleaves, will be at least £20,000 per annum. Long-distance overhead transmission wires have not been much used in England; but in America and elsewhere, lines are operated at a pressure of 60,000 volts. The promoters of the scheme under notice base their calculations on a pressure of from 20,000 to 25,000 volts. The lines will be carried over private property from St. Neots to Stevenage, and from Stevenage to Enfield over a private right-of-way belonging to the Railway Company. At Enfield, a receiving sub-station will be erected, and thence underground mains at 20,000 volts will be employed, laid in the 6-feet ways or along the towing paths of the canals around London or the property of various railway companies requiring energy for electrification purposes.

As regards the financial aspect of the question, it is estimated that the cost of energy in bulk will not exceed ¾d. per unit generated (reckoning on a load-factor of 35 per cent.). Under these conditions, the selling price to bulk consumers will be ½d. per unit, after providing for depreciation and reserve and a dividend of 6 per cent. on a capital of £2,500,000. The promoters profess that they do not desire to enter into competition with the present Companies in retail distribution. In fact, some of the larger of these Companies have already given their adhesion to the scheme; preferring to meet the growing demands of their customers by purchasing electricity in bulk to incurring the heavy expense of altering and extending their present plant. It is also anticipated that the Railway Companies and the local Councils will be large purchasers.

LONDON COUNTY COUNCIL AND ELECTRICITY SUPPLY.

The Supply of Electrical Energy in London and Certain Suburbs.

At the Meeting of the London County Council last Tuesday week, the Parliamentary and Highways Committee presented a joint report on the Bill of which the Council have given notice for the above-named object, and to which some reference has already been made in the "JOURNAL." The proposals of the Council are so important that we give practically the whole of the report, together with one by the Finance Committee dealing with the money aspect of the subject.

The Council on the 14th of November resolved to seek statutory authority in the session of Parliament of 1906 to enable them to supply electrical energy in London and certain surrounding districts. In accordance with the terms of the resolution passed on that date, we now submit an outline of the scheme which we propose shall be adopted; and we place before the Council the draft of the Bill which has been framed to secure the objects in view. Our former report dealt generally with the importance of meeting more adequately the growing demands for the supply of electrical energy for general and for commercial use in a convenient manner and at cheap rates, and pointed out that it was generally recognized that this important object could only be secured by the establishment of a large central supply undertaking dealing with an extensive area.

Details of the Proposed Scheme.

For some considerable time the Council's officers have been working under our direction upon the details of a scheme to be submitted to Parliament in regard to the Council's Bill of 1906. The work was entrusted to the Chief Officer of Tramways and the Tramways Electrical Engineer; but, in view of the importance of the scheme, and in order that every detail in connection therewith should be put forward on a sound and practical basis, we thought it best that expert assistance should be retained to assist the Council's officers both in working out the scheme in its initial stages and by giving evidence in due course in support of the Council's Bill. For this purpose we secured the services of Sir William H. Preece, K.C.B., F.R.S., Past-President of the Institution of Civil Engineers, Mr. Robert Hammond, M.Inst.C.E., M.I.E.E., and Mr. John F. C. Snell, M.Inst.C.E., M.I.E.E. The officers have carefully considered the subject and have reported exhaustively thereon; and the several Committees concerned have had personal interviews with the experts on the question. As the result, the officers, in consultation with the experts, have submitted to us a complete scheme, and they have been able to prove conclusively to our satisfaction that it is feasible and practicable, and would not only be of great assistance to authorized distributors, but would also be of great public benefit. It should, we think, be pointed out that, under the scheme of the Administrative County of London and District Electric Power Company of last session, there was provision in the Bill to enable the Company, under certain conditions, to compete in their respective areas with distributing undertakers. The scheme now submitted, however, has been framed on the basis of the Council co-operating with existing Local Authorities and Companies, and not competing with them by retailing energy without their consent. The proposals now put forward by us on these lines will, we are advised by the experts, enable electrical energy to be produced on the scale which it is now generally recognized is essential to economical generation, and supplied on terms as favourable as would be possible under any scheme.

The scheme provides for the temporary surplus of energy from the Council's tramways electricity generating-station at Greenwich being supplied as required at the earliest possible date to some of the existing distributing undertakings. The Council are aware that the erection of the second section of the Greenwich generating-station is already in progress; and, in view of the arrangements which have been made with regard to the early reconstruction of the Council's northern tramways, the large number of new tramways which the Council are authorized to construct, and the suggested tramway extensions, the whole capacity of both portions of the station—namely 34,000 kilowatts normal—will not within the next five or six years be required entirely for tramway purposes. Our suggestion is, therefore, that advantage should be taken of this fact to press forward the work on the second section of the Greenwich generating-station, in order that, as far as possible, this station may for a time, as stated, meet certain of the demands for electrical energy which cannot be dealt with by existing undertakings. In the meantime, it is proposed that a station shall be erected on land by the riverside at Battersea to be specially acquired for the purpose. This station will, in the main, serve for the supply of energy to distributing undertakings, and ultimately for the purposes of the Council's own tramways. This will ensure a very economical form of supply. The resolution of the Council of the 14th of November did not contain specific provision for the establishment of this station to be included in the Bill of 1906. The site suggested for the proposed new station is situated on the south bank of the Thames near Grosvenor Road Railway Bridge; being part of the land belonging to the Metropolitan Water Board. The site proposed to be acquired has an area of about 15 acres, and is estimated to cost £120,000, which includes all legal and other charges. It is proposed that a portion of the site which will not be required for the bulk supply undertaking shall be utilized for tramways purposes.

It is proposed that on this site, which was formerly used by one of the London Water Companies, a station of 80,000 kilowatts normal capacity shall be erected. The scheme which we have considered provides for this station to be built in three stages as the demand for energy increases—viz., that the first two quarters, comprising together 40,000 kilowatts normal capacity, should be put in hand as soon as the necessary parliamentary powers shall have been obtained; and that the third and fourth sections, each of 20,000 kilowatts normal capacity, should be added either consecutively or together, according as the increase in the demand may justify. While the temporary supply is being given for bulk purposes from Greenwich, it is proposed

to charge the bulk undertaking with the average cost, including a proper proportion of the capital charges. So soon, however, as a considerable section of the Battersea station shall have been completed, it will be more economical, from the point of view of distribution, to supply energy to the tramways from both Battersea and Greenwich stations to meet the demands for tramway purposes from the western and eastern sections of the county respectively.

We would point out that it has always been the Council's intention to provide two generating-stations for the supply of electric power for its tramways—one at Greenwich, in the eastern half of the county, and the other to serve the lines in the western half—such further station to be erected on a site which the Council specially acquired for the purpose at Pimlico. Other arrangements have, however, now been made for the utilization of the Pimlico site; and our present proposal to erect the new station at Battersea is merely an extension of the Council's original scheme, while the Battersea site will be more economical and convenient in some respects than the Pimlico site. Moreover, owing to the much larger scale on which energy is proposed to be supplied, it will be possible ultimately to generate such energy for tramway purposes at a lower cost than would have been practicable under the original scheme. It will be possible, in the majority of cases, to utilize the existing and proposed tramways sub-stations as bulk-supply centres —a course which will effect very considerable economy both in regard to capital expenditure and cost of maintenance. While surplus electrical energy is being supplied from the Greenwich station for bulk purposes, the bulk-supply undertaking will, it is suggested, provide the necessary cables and ducts for transmitting the energy to the supply centres. By adopting this scheme it appears to us that very important advantages will be secured which would not be possible in the case of any proposal contemplating the installation of an entirely fresh undertaking.

In the report on the subject considered by the Council on the 14th of November, it was pointed out that one important objection raised against the Administrative County of London and District Electric Power Company Bill of last session was that enormous powers would have been conferred on private individuals in respect of the breaking-up of streets and the interference in other ways with public property. It seems to us to be obviously desirable that rights such as these should only be in the hands of a public authority; moreover, as the Council is itself from time to time laying electric mains in various parts of London for tramway purposes, considerable convenience and economy will be effected by placing the two services in the hands of the same central authority.

We realize that in the near future the growing demands for electrical energy within the area of supply must necessitate considerable capital expenditure in the provision of additional plant and equipment to meet such demands; and we are satisfied that such expenditure can be incurred to the greatest advantage by the Council being empowered to supply electrical energy upon the large scale proposed rather than by extensions of existing undertakings in a manner which does not permit of production on the most economical scale.

Provisions of the Draft Bill.

A Draft Bill has been prepared by the Parliamentary Committee, and there are certain provisions in it of special importance, to which we would direct attention.

(1) *Area of Supply.*—The total area of supply dealt with comprises 387 square miles, including the County of London (117 square miles) and an area surrounding London comprising 270 square miles.

(2) *Powers of Supply.*—Powers are sought to enable the Council to supply energy (*a*) to authorized distributors, (*b*) to large commercial undertakings, such as railways, tramways, canals, docks and waterworks, for use either wholly within or partly within and partly without the area of supply; provided that the Council shall not furnish a supply for use wholly within the area in which any local authority or company are authorized to give a general supply of electrical energy, without the consent in writing of such local authority or company.

(3) *Erection of Generating Station.*—Authority is proposed to be sought to enable the Council to erect a generating-station on lands at Battersea which are scheduled to the Bill for the purpose.

(4) *Co-Working with Tramways Undertaking.*—Necessary clauses are included in the Bill to enable the Council to work the bulk-supply undertaking in conjunction with its tramways undertaking.

(5) *Revision of Prices.*—Provision is included in the Bill for the revision, in certain circumstances, of the prices charged by authorized distributors.

(6) *Financial Clauses.*—Various financial clauses have been inserted in the Bill, providing (*inter alia*) for the establishment of a reserve fund, &c., which are necessary to place the undertaking on a sound financial basis. Provision is also made with regard to the allocation of surplus revenue from the undertaking, in such a manner as to provide, in our opinion, the greatest possible security compatible with benefit to the consumers.

Conference with Local Authorities and Companies.

The Council will remember that on Oct. 24, 1905, they authorized us to make arrangements for a conference with representatives of the City Corporation and the Metropolitan Borough Councils to consider this question, and also to confer with the companies concerned as we might think fit. We held a conference on the subject with the London Local Authorities on the 20th of November, and, after a very full discussion of the matter, the conference, by a large majority, passed the following resolution: "That this conference of Borough Councils approves of the introduction by the London County Council of a Bill for enabling it to supply electricity in bulk, subject to the interests of Borough Councils' existing undertakings being safeguarded and the details of the measure proving to be otherwise satisfactory." The conference expressed the desire to have a further opportunity of meeting and conferring in greater detail upon the Council's proposals; and it was arranged that the necessary facilities should be given for this purpose, the conference either being summoned for a second meeting or a full communication being addressed to each Borough Council dealing in greater detail with the Council's scheme. In framing the Draft Bill, we have endeavoured in every way to meet the desire expressed by the authorized distributors who have already established distributing undertakings that they might be safeguarded; and we hope that the Bill in its present form will secure that object. In the event of the Council approving the Bill, we propose to forward it for consideration to each of the Borough Councils, and, if necessary, to arrange for a further conference. We have also been in communication with the Local Authorities outside the County of London who are affected by the Council's proposals, and have had an opportunity of conferring with representatives of certain of the Electric Supply Companies concerned.

In framing our scheme, we have aimed at providing the most efficient and cheapest possible supply at the minimum cost; and, with a view to economy and to saving the Council capital expenditure, we have so drafted the Bill as to enable it to take advantage of any co-operation which existing undertakers in the proposed area may be prepared to give to the Council. It is clear that, if any such co-operation is forthcoming, as it would be given largely, at any rate, on capital already expended by such undertakers, it should lessen the Council's capital expenditure. While we have not in our scheme counted upon any such co-operation, the saving to the Council in capital cost which might be effected thereby should not be disregarded in considering the scheme.

Recommendations.

The recommendations which we now submit are—

(*a*) That the operation of the Standing Orders relating to the submission to the Council of schemes involving application to Parliament be suspended on this occasion, in order that the subjoined recommendation (*b*) may be considered.

(*b*) That authority be sought in the session of Parliament of 1906 to enable the Council to acquire compulsorily the site situated on the south bank of the River Thames at Battersea, shown in red colour on the plan submitted to the Highways Committee on Nov. 16, 1905, for the erection of an electricity generating station for the supply of electrical energy in bulk.

(*c*) That the London County Council (Electric Supply) Bill, 1906, submitted by the Parliamentary Committee, be approved; that the seal of the Council be affixed to a petition for leave to bring in the Bill; and that the Bill and petition, with any such necessary alterations (if any) in the Bill as the Parliamentary Committee may consider desirable, be deposited pursuant to the Standing Orders of Parliament.

REPORT OF THE FINANCE COMMITTEE.

The Council will remember that in reporting on the 14th of November on the proposal that the Council should seek powers in the next session of Parliament to supply electricity in bulk, we pointed out that we had not had before us any financial data to enable us to advise the Council as to the financial bearings of the proposal, and that it was, in our opinion, most desirable that, before the Council committed itself to the undertaking, a definite scheme should be prepared and submitted.

In adopting the recommendations of the Highways Committee on this subject, the Council added the following proviso: "Provided that, before the introduction into Parliament of any Bill, opportunity shall be afforded for full discussion in the Council of its provisions, especially as they affect the financial consequences of the scheme." Since then a scheme has been prepared under the direction of the Highways Committee by the Council's officers assisted by three well-known engineering experts, and we have been supplied with the details so far as they have been elaborated, and with copies of the Draft Bill which the Council will be asked to approve. The two main financial considerations on which the Council will look to us for advice are (1) the estimate of capital outlay required, and (2) the possibility of the scheme being self-supporting.

The Scheme of the Bill.

We observe that the Bill is based upon the principle of supply to authorized undertakers and others throughout the area by agreement only, and that it is entirely of a permissive character. There will be no power for any authorized distributor or other person to demand a supply, and consequently no obligation on the Council to give it. The optional nature of the powers to be sought, if that option is maintained, may be held to lessen to a certain extent the financial risks which attend the undertaking.

The Bill appears to avoid competition with the existing undertakers (companies and local authorities) as regards the distribution of electricity, because it will not confer upon the Council the powers usually conferred on power companies enabling them to enter, under certain conditions, the districts of authorized distributors, or to bring pressure to bear upon such distributors to take a bulk supply. The result will be that the Council must look to existing distributors to push the development of the use of electricity for power purposes. We note, however, that clause 35 of the Bill provides machinery which would enable manufacturers to obtain a supply through existing undertakers at cheaper prices than at present prevail, and would thus tend to assist the extension of the use of electricity.

Our attention has been directed to the extent to which powers of supply in the proposed area are already possessed and exercised by other bodies and companies. It seems that nearly the whole area is covered by local authorities or companies possessing Provisional Orders, and over a large part of the area bulk powers, practically identical with those proposed to be sought by the Council, have been granted by Parliament to certain power and electric companies.

The Council would not, therefore, possess any monopoly in the districts over which bulk powers are possessed by companies, but would have to meet the competition of those companies. In other districts, the Council would have no power to secure business except by coming to terms with the existing undertakers. In order to secure business, therefore, the Council must rely entirely on the cheapness of the price at which it can produce electricity. The significance of this fact, to which we refer again later on, will be apparent to the Council.

Estimated Capital Outlay.

The total capital powers sought by the Bill may be stated in round figures at £2,500,000. Details of this sum have been submitted to us. The expenditure of this amount is estimated to be spread over seven years to 1913. The amounts required in the first three years are estimated at £355,000 in 1907, £545,000 in 1908; and £449,000 in 1909, or £1,349,000 in all. The reduction of the proposed immediate capital outlay to these figures diminishes the objection we feel to the increase in the Council's commitments on capital account; but the addition of £1,349,000 to the sums already required to be raised in the three years is a matter of important concern.

The establishment of a bulk undertaking by the Council for supplying the Borough Councils will, no doubt, reduce the amounts which these Councils might otherwise require on loan for the extension of their generating plants, which sums would probably be borrowed from the Council, and raised by the issue of London County consolidated stock. It is, however, necessary to point out that the erection of a large central bulk generating-station involves the expenditure of a large amount of capital on transmission mains in order to convey the current to local centres, and that the net saving on capital outlay, although considerable, is reduced by this expenditure; the most important saving being made on working expenses. Moreover, the Council's bulk undertaking would deal with a much larger area than that covered by the undertakings of the Metropolitan Boroughs.

Probable Financial Results of the Undertaking.

We have had before us certain estimates of working costs and the probable growth of demand for electricity; but the figures are at present only of a provisional character, and we are advised that the publication of any estimates at the present stage might prejudice the Council's case before a Committee of Parliament. We are consequently placed in a position of difficulty, because while we feel that the Council ought to have before them some means of judging as to the financial prospects of the scheme, we are unable, for the reasons stated, to submit any figures. We propose to give further consideration to the estimates when they have been more fully worked out; and we may deem it necessary to report to the Council thereon at a later stage. It is essential, in our opinion, that whatever estimates are placed before Parliament in support of the Bill should have been thoroughly scrutinized by us, because such estimates practically commit the Council. It is true that before any liability is incurred and money voted by the Council under powers which may be obtained from Parliament, estimates would have to be submitted, when the whole question could be thoroughly considered; but the Council would find itself, as it has done in other cases, committed in the main to the scheme and estimates already placed before Parliament. The Council will therefore see the necessity of the matter being thoroughly considered now.

While not in a position to make public at this stage any of the figures submitted to us, we may say that, from such consideration as we have been able to give to them, we anticipate that the Council would be able, from one or more large central stations, to generate electricity at a cheaper rate than it is now being produced at the small generating-stations of most of the existing undertakers, and, moreover, that the Council, by working the scheme in conjunction with its tramway undertaking, would be in a favourable position for supplying energy in bulk and at a reasonable price. We cannot at present say whether the Council could supply at such low prices as would enable it to successfully compete for business with the large power and electric companies who possess powers of supply in bulk throughout a large part of the proposed area. This is, after all, the crucial question, because, as already pointed out, it does not appear that the Council will possess any monopoly, but will be mainly dependent for business, so far as we can see, upon its ability to sell at a price which would induce existing undertakers to take a supply from it. The selling price from time to time will depend upon a variety of considerations which at present are undetermined. A good deal will turn upon the load-factor which can be obtained, and the amount of support to be received from authorized undertakers. The price later on may be affected by the progress of knowledge in the methods of generating and transmitting electrical energy, and the action of other companies and bodies which cannot be foreseen.

The position which the Council will occupy in this matter has engaged our serious attention, aad we cannot help thinking that the Council ought, before embarking capital in such an enterprise, to have some further security than it will apparently possess. We are not prepared at the moment to say what the nature of the security should be; but it would appear to lie in the direction of the Council making suitable and permanent arrangements with the existing undertakers. Having regard to all the contingencies and risks inseparable from an undertaking of this kind, we think that the Council will agree as to the expediency of seeking some security for its undertaking, particularly as we have not at present been supplied with definite information as to the amount of support which the Council is likely to receive.

Whatever conclusion may hereafter be arrived at as to the probable ultimate financial results of such an undertaking as the Council may obtain power to establish, we are of opinion that the Council must face the probability that, during the early years, the undertaking will show a deficiency which will have to be made good out of the rates, because from its nature some years must elapse before a sufficiently large amount of business can be secured to make the concern profitable.

The Financial Provisions of the Bill.

We have considered the purely financial provisions of the Bill, which, speaking generally, are, in our opinion, satisfactory. There are, however, four financial clauses on which the Council will desire to have our observations.

Clause 36 (2) provides that the Council shall not be bound to commence payments into the sinking fund until the expiration of five years from the end of the financial year current at the passing of the Act. A period of seven years was allowed in the cases of the Holborn to Strand and Westminster improvements; but we concur in the proposal to ask

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

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for a postponement of five years only in the present case, and think that the assent of the Treasury may probably be obtained to this clause. We may point out that debt will have to be repaid, after payments to the sinking fund commence, in periods less than the usual by the number of years during which payments have been postponed. Thus capital expenditure, which would be repaid in 59 or 25 years in the ordinary way, will have to be repaid in 54 or 20 years after the expiration of the five years' postponement allowed.

Clause 42 provides that the Council may pay (to an amount not exceeding £105,000) out of borrowed money interest paid on capital during construction. This would be a novel power so far as the Council is concerned. We approached the Treasury with a similar proposal in connection with the Holborn to Strand Improvement in 1899; but their Lordships would not assent to it. We have, however, since our former report was before the Council, ascertained that there have been in recent years cases in which Provincial Corporations have obtained this power in the case of large water and dock undertakings which occupy many years in construction, and necessitate the payment of large sums of interest on capital before the undertakings produce any revenue. The views of the Treasury may consequently be somewhat modified; but the Council cannot rely upon obtaining this concession.

The Bill provides (clause 39) for the creation of a reserve fund. No limit to the amount of the fund is fixed by the Bill; and it will be in the power of the Council to apply surplus revenue to build up an adequate reserve fund. Under clause 38, which provides for the order in which revenue shall be applied, the provision of a reserve fund follows payment of working expenses and debt charges. Provision is then made for the repayment to the county fund of any deficiencies made good in previous years out of the county rate; but under the provisions of the Bill, the Council is not bound to so repay the county fund in the first year in which a surplus is available; it being left open to the Council to use such surplus to form a reserve fund or to reduce prices. After deficiencies met out of the county rate have been made good, the Council may, out of any surplus, take a sum not exceeding in any year 5 per cent. on the aggregate capital expenditure for the benefit of the London ratepayer, who, we may remind the Council, will, if the Bill passes in its present form, bear the whole financial risk of an undertaking dealing with an area over three times that of the County of London. Any surplus remaining after this 5 per cent. must be applied to reduction of charges; the Council being entitled to carry forward such balance on revenue account as is reasonably necessary.

The last clause to which we think attention should be called is clause 43, which provides that the Council shall, after five years from commencing to supply from any generating-station erected under the powers now sought, and each three years thereafter, fix the prices to be charged (other than those contained in any agreement or contract), so that, as far as practicable, no charge falls upon the county rate.

In conclusion, and looking to all the circumstances, we are impressed with the fact that financial risks are inseparable from an enterprise of this kind covering so large an area, and that if such risks mature, the burden will fall entirely on the ratepayers of London. Bearing this in mind, we are of opinion that if, on the grounds of general policy, the Council should finally decide to promote the Bill, every endeavour should be made to make arrangements with existing undertakers for the supply to them by the Council of electrical energy in bulk.

Discussion on the Reports—The Scheme Sanctioned.

Dr. NAPIER (the Chairman of the Parliamentary Committee) moved the adoption of the recommendation to proceed with the Bill, which, he said, fulfilled the three requisites necessary in a matter of this kind—viz., (1) a cheap supply of electricity; (2) that such supply must be obtained without injury to the existing undertakings, or with as little injury as was compatible with a really cheap supply; and (3) that it should be offered by a public body, but with no permanent charge upon the rates. They were all agreed that in the inception of such an undertaking there must for a year or two, in all probability, be a small charge upon the rates. The Council were in peculiarly happy circumstances for carrying out such an undertaking, because they already had to generate electricity for their tramways; and the stations and plant set up for one supply would do for the other. They did not intend to go direct to the private consumer; and he trusted the Borough Councils would note the self-denying ordinance that they did not intend to compete with either the boroughs or the companies in their districts. They would have to spend the £2,500,000 at some time for supplying electricity to the tramways. It was a permissive scheme, and the Council would not be bound to set in motion the undertaking unless it was assured that it was likely to be a financial success. Whether, if the Bill passed, the undertaking would be put in operation, depended largely on the action of the Borough Councils and the Companies of London. He hoped these authorities would recognize that the Council did not desire to compete with them or to aggrandize itself. What they wished was to save the Councils from destruction, which would be their fate if the Bill of the Administrative Company were carried.

Mr. H. P. HARRIS remarked that the Council were engaged in the process of putting the cart before the horse. It was usual with business people who were not county councillors to consider the possible financial results before embarking on any undertaking; but in this case they had no estimates before them. He believed that the real reason why the Finance Committee had not put forward any estimates of working expenses and probable revenue which would bear the test of examination, was because they had not had any before them. From the report of that Committee, it seemed that not only would the Council not have a monopoly, but it would apparently have very little business. From an examination of the undertakings of the Borough Councils, it seemed very doubtful whether the County Council would get a large amount of custom from them. With regard to the permissive character of the Bill, he was very doubtful whether Parliament would allow it to remain in that form.

Sir R. M. BEACHCROFT asked if it was likely that even a Liberal

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Parliament would allow electric power questions to be suspended until the Council saw their way to proceed. It seemed to him that the scheme would result in a loss to the ratepayers.

Mr. R. A. ROBINSON pointed out that at the recent conference 14 Borough Councils had voted in favour of the introduction of the Bill, 6 against it, and 8 did not vote at all. The boroughs whose representatives voted against it had a rateable value of £12,800,000; and those who did not vote, a rateable value of £11,000,000. The money the Council were losing on the steamboats would be a mere fleabite to what they stood to lose on this undertaking.

Lord WELBY said he regretted he was unable to support the Bill; but he had no alternative, holding the view he did that the Council were at the present time in danger of overstraining their credit. They were committed to about £9,000,000 on the Holborn to Strand and the Westminster improvements, and for some years there must be a charge on the rates for interest. Then they were committed to heavy tramway expenditure, to the Rotherhithe Tunnel, and to the new County Hall. They might be called upon at any moment to guarantee money for the improvement of the Port of London; and they had a continually rising education rate. In addition, they had to allow for a deficit upon the Thames steamboats. Thus they had to meet a very formidable bill within the next few years. In every one of these cases they had to go to the Money Market; and it was their master. If they wanted to keep up the credit of the Council, it was necessary that they should prove to the Money Market that they were going soundly and prudently so far as expenditure was concerned. It was not sufficient, as so many of his colleagues seemed to think, simply to say that the things that were being done were useful. As to the proposed Bill, he felt they were taking a leap in the dark; and he was so convinced of the danger of the policy which put finance aside and only considered the scheme in view, that he must vote against it.

Mr. M'KINNON WOOD remarked that if the Council did not go forward with the Bill it would mean that London would be given over to the monopoly of a private Company.

On a division, the recommendation was carried by 66 votes to 38.

Nottingham Gas Question.—The following statement on the subject of the recent discovery in connection with the gas supply of the city appeared in last Thursday's "Nottingham Guardian:" "The Nottingham City Council met in committee in the Exchange yesterday morning to consider a report of the Gas Committee as to the alleged irregularities at one of the works. The question of the propriety of admitting the Press was discussed; but no resolution was passed. After hearing a full statement of the facts of the case from Mr. E. Harlow, the Chairman of the Gas Committee, the Council decided to defer discussion of the matter till early in the new year. It is understood that when the full report of the Committee is presented, the discussion shall take place in public."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. Simmance's report upon the lighting of Edinburgh has not been before the Town Council yet; being still in the hands of the Sub-Committee, for further consideration. The account of expenses incurred in connection with the investigation was, however, before the Town Council on Tuesday. Considering the time which was bestowed upon the investigation—one month—it need cause no surprise to learn that the amount was £500.

The Gas Commissioners, on the previous day, had the subject before them—being, in point of fact, the only business of public interest which they transacted at their monthly meeting. It was introduced by Bailie Maxton, who said that the report had been circulated among the members of the Edinburgh Town Council; and he asked if copies had been sent for the use of the Gas Commissioners. Mr. W. R. Herring said that the Town Clerk had sent him one copy, and that he had pointed out that there were members of the Gas Commission who were not members of the Edinburgh Town Council, and asked that he might be furnished with ten copies of the report for their use. He had not yet had a reply, but he would distribute the reports as soon as he received them. Provost Mackie, of Leith, who presided, said they could not do anything in the matter until they had seen the report. Mr. A. A. Murray expressed the hope that the Works Committee of the Commission, when considering such an important matter as the proposed reduction of the candle power of the gas, would take all the members of the two Corporations with them. Bailie Maxton pointed out that they could not reduce the candle power below the authorized standard without obtaining Parliamentary sanction; and the Chairman said this would be kept in view.

It is not often that we hear of exhibitions of gas appliances in Glasgow. The Gas Department were the first in Scotland to work up this side of the gas business; and it has all along been so successful a venture that it has required no buoying up. But gas being now plentiful, there is a disposition to bring the advantages of its use more prominently before the community. One of the means of doing this has been taken this week in the holding of an exhibition, by the Gas Department, in the Morison Memorial Hall at Clydebank. The exhibition was opened on Monday afternoon by Mr. A. Wilson, the Gas Engineer, who briefly explained its objects. Lectures were given during the week by Miss Gandy, of Glasgow. A very wide range of appliances was shown.

Municipal trading formed the subject of discussion at the Kilmarnock Town Council last week. Some time ago the Council resolved to open a shop in which to exhibit and sell gas cookers and fires. The subject of discussion this time was the selling of gas fittings and appliances. The Gas Committee first considered the matter. Mr. Smith moved, in

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Committee, that they do not sell fittings and incandescent mantles in the shop. Mr. Stevenson moved, as an amendment, that the Manager be at liberty to sell fittings and mantles at list prices. On a vote being taken, five voted for each, and the Chairman gave his casting vote in favour of the motion. In the Council, Mr. Stevenson moved that they sell all appliances in connection with lighting, heating, and cooking in the shop. Mr. Smith moved that they do not sell anything in the shape of fittings. Treasurer Gemmill thought that Mr. Stevenson was going too far. He moved that the Manager be at liberty to sell gas fittings and mantles at list prices. After a somewhat rambling discussion, the Council divided, when fifteen voted for Mr. Smith's motion; seven for Mr. Stevenson's motion; and two for that of Treasurer Gemmill. The sale of fittings and mantles under the auspices of the Corporation of Kilmarnock is, therefore, prohibited, though the sale of cookers and heaters may go on.

On the recent occasion of the visit of the Corporation of Aberdeen to the gas-works, to inaugurate new buildings, including rooms for the comfort of the workmen, it was intimated that the workmen were to be entertained in their new apartments by the Town Council. On account of the exigencies of work, and also of the space at disposal, it was resolved that the entertainment should take place on three separate evenings. The first of these took place on the evening of Friday of last week. Supper was served to 130 workmen. Lord Provost Lyon, who has newly taken office, presided, and was supported by several members of the Town Council, and also by Mr. D. Milne, the Manager, and Mr. C. Smith, the Assistant-Manager. Lord Provost Lyon said that the Gas Department was one of the most important works under the management of the Council. Aberdeen was a city that had made great progress, and, along with the other departments, they had increasingly engaged in gas making, until now they had a staff of 360 employees. He was very pleased to know that, under Mr. Milne's careful supervision, everything was done to make the employees as comfortable as possible. A very good entertainment was given, in the course of which Mr. G. Kemp, the Convener of the Gas Committee, expressed pleasure at seeing the men "in their own house." The customary votes of thanks were awarded.

One of the first steps taken by the Town Council of Monifieth on becoming the owners of the local gas undertaking has been to reduce the price of gas from 6s. to 5s. per 1000 cubic feet.

The newly-constructed Brechin Gas Company held their first statutory meeting on Wednesday last. Mr. James Guthrie, J.P., was elected Chairman of the Company, and Mr. Allan Reid was appointed Manager and Treasurer; both being continuations of the offices held by them previously.

Fatal Gas-Works Accident at Birmingham.—A flue-cleaner, named Matthews, at the Nechells Gas-Works of the Birmingham Corporation, met with a shocking death last Tuesday. He was engaged in cleaning out a flue, when he got caught on a coke-conveyor. He was carried along, and struck a pulley with great violence, breaking his neck.

CURRENT SALES OF GAS PRODUCTS.

Week ending Dec. 23.

In consequence of the impending holidays, the London market has been quiet, and without any alteration in prices. The demand for benzol and toluol continues good; while there are several inquiries for pitch. The latter article is being shipped in large quantities this month. Sulphate of ammonia is also unchanged at £12 15s., on Beckton terms, for January-March.

Sulphate of Ammonia. LIVERPOOL, *Dec.* 23.

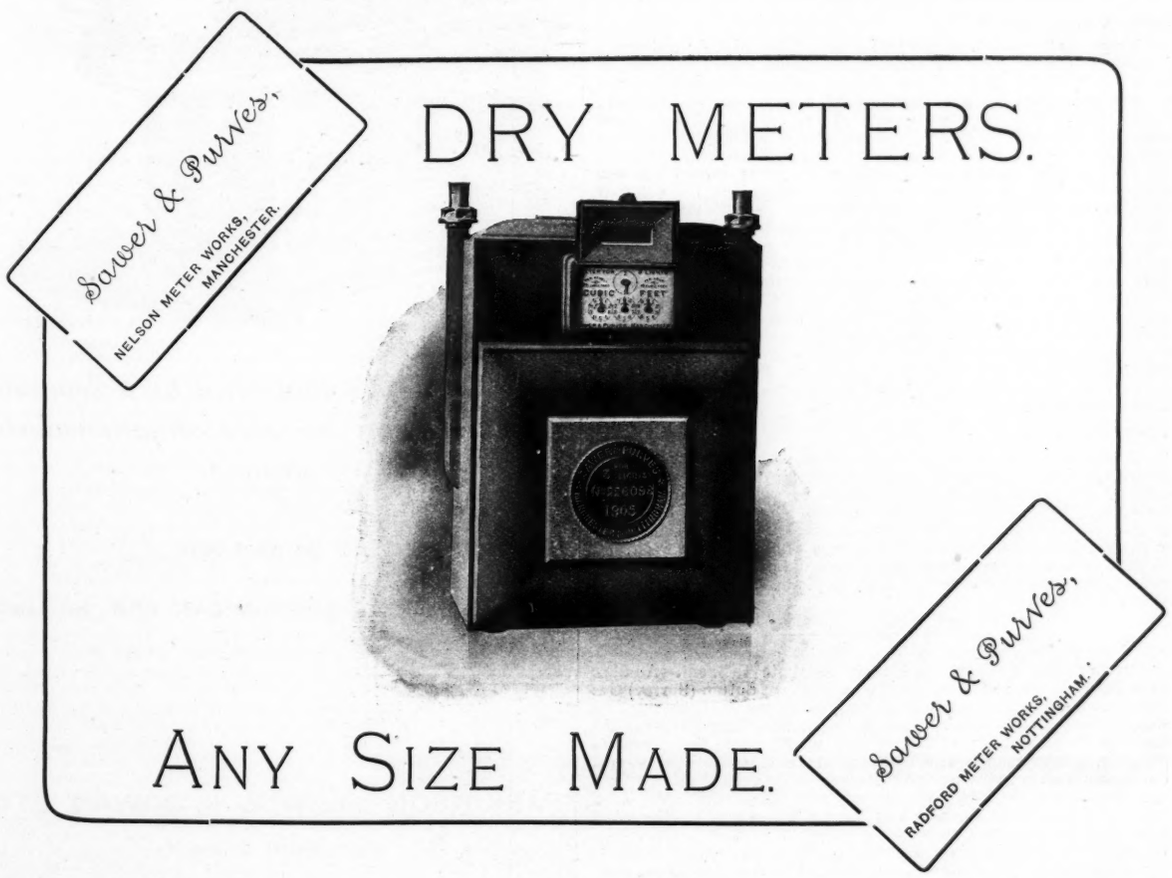
The market has again been weak, and there has been a further slight depreciation in values; the closing quotations being £12 3s. 9d. per ton f.o.b. Hull, £12 6s. 3d. per ton f.o.b. Liverpool, and Leith nominally £12 10s. per ton f.o.b. There has been a good deal of buying, but not enough to arrest the decline in values. For delivery ahead, buyers abroad are looking for still lower prices; but U.K. manufacturers maintaining for the most part a firm attitude, middlemen have become less keen about selling, and consequently business done has been smaller than in recent weeks.

Nitrate of Soda.

This article has been a quiet market; but spot prices remain 10s. 9d. and 11s. per cwt., for ordinary and refined qualities respectively.

Tar Products. LONDON, *Dec.* 23.

There has been very little business done during the past week, which is doubtless owing to the approach of the holidays. In carbolic acid, crude continues very steady, and there is still a fairly good business doing in 60's at 1s. 9½d. for prompt; while for January-June next year makers still ask 1s. 10d. There is a little business also reported in 50's at prices varying from 1s. 6½d. to 1s. 7½d., according to port of shipment. The position in crystals remains unchanged, and there is no business of importance to advise. In 90 per cent. benzol, there is really no business doing at the moment. There are still sellers in London at 10½d., which price, however, consumers decline to pay for either prompt or forward delivery. In toluol, an offer of 11d. was declined for January-June next year, while 1s. is reported to have been paid for prompt shipment by consumers. The London market for creosote is quiet, and there is certainly more offering for both prompt and forward delivery, probably owing to the fact that some of the American business for next season has evidently been taken by distillers in the North of England. As regards Yorkshire and the Midlands, the demand is very good, and manufacturers do not appear at all anxious to sell for either prompt or forward delivery. Solvent naphtha is still very scarce, though there is certainly more offering for forward delivery. Sales of 90 per cent. at 160° are reported at 1s. London



for prompt, but a slightly easier tone prevails forward. There is really very little business doing in pitch, and London makers do not appear at all anxious to sell for early delivery; but, at the same time, the market is undoubtedly quiet forward. One or two small parcels are reported to have been sold in Yorkshire at low prices, though the actual figures have not yet transpired. There is still a fairly good inquiry for January-June from South Wales; but dealers are not prepared to accept the low prices offered by consumers. There is certainly more pitch offering in the Provinces for forward delivery than was the case a little while ago, though London makers appear fairly clear of stock. Just at the present time dealers seem to be offering London pitch at under the prices quoted by makers, which will most probably have the effect of reducing values here, as it is reported that some quantity was actually offered at under 33s.

The average values during the week were: Tar, 18s. to 22s.; Pitch, London, 33s. to 34s.; east coast, 32s. 6d. to 33s.; west coast, 31s. to 32s. Benzol, 90 per cent., 10d.; 50-90 per cent. 10¼d. to 10½d. Toluol, 11¼d. to 1s. Crude naphtha, 4d.; solvent naphtha, 11¼d. to 1s. 1d.; heavy naphtha, 11¼d. to 1s. 1d. Creosote, London, 1⅜d. to 1⅝d.; North, 1¼d. to 1⅜d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9¼d. to 1s. 9½d. Refined naphthalene, £4 10s. to £9; salts 20s. to 22s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market during the past week has been very quiet, especially for early shipment, though there is still a fairly good inquiry for forward. Beckton are not sellers for prompt, and are asking £12 15s. for January-March shipment. In Hull, business is reported at £12 5s. to £12 7s. 6d., according to quality, for early delivery; but makers are not prepared to consider forward business at under £12 8s. 9d. to £12 10s. In Liverpool, sales are reported at £12 7s. 6d. for prompt shipment; but makers will not entertain this price for forward delivery. Business is reported in Leith during the past week by manufacturers at £12 10s. for December shipment; but for January-March, they are asking £12 15s., and will not consider anything under £12 12s. 6d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

All departments of the coal trade are at the present moment in a more prosperous condition than at any period during the last twelve months. Whether it will last long, is a matter of conjecture. In house coal, merchants and colliery proprietors are busy; but the old prices continue. There is a better demand for furnace coal; and dealers are securing an advance of from 3d. to 6d. per ton on contracts for 1906. The inquiry for slack is stronger than ever. Steam coal is in moderate request; while cannel is going out in maximum quantities. Quotations are unchanged, except on new contracts.

Northern Coal Trade.

There has been a strong demand for most classes of coal; and where there were supplies early available, higher prices were obtainable, as there was a strong desire to get quantities that were needed before the holidays. Best Northumbrian steams rose to 10s. per ton f.o.b., second-class steams have been sold at 9s. to 9s. 3d., and steam smalls are firm at from about 5s. to 5s. 9d., at which price they are somewhat scarce. Both at the steam coal and gas coal collieries, the work is fuller; and heavy quantities are being turned out and shipped now and up to the verge of the holidays. In the gas coal trade, the demand is very full, and is being fairly met; the mild weather allowing a good tonnage to be shipped, so that heavy lots have been sent out on the large contracts, for the South especially. Local requirements are also good; so that the collieries are fully drawn on, and there is a very limited margin beyond the quantities contracted for. Prices are from 8s. 6d. to 9s. 3d. per ton f.o.b., according to the quality; and the best Durham gas coal is firm in price. As to contracts, there is a large one in the market for one of the Scandinavian cities, but it will not be decided for perhaps a month. Coke is firm; and this influences gas coke to some extent. Supplies of gas coke are very full, so that stocks are increasing in certain parts. The price is unaltered this week.

Scotch Coal Trade.

Trade continues to be very active; the output from Fife being particularly large. There is talk of the holidays being curtailed in some places, on account of the orders on hand. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 3d., and spent 9s. 9d. to 10s. The shipments for the week amounted to 259,965 tons—an increase of 17,619 tons upon the previous week, and of 26,794 tons upon the corresponding week of last year. For the year to date, the total shipments have been 11,960,828 tons—an increase of 646,137 tons upon 1904.

Sutton Gas Company and their Sulphate Effluent.—Another stage has been reached in the dispute between the Sutton (Surrey) Gas Company and the District Council over the disposal of the sulphate effluent from the gas-works. Some weeks ago the Council complained that the bacteria beds at the sewage works were not operating properly, in consequence of the discharge of the effluent into the sewers; but to this the Company replied that not a single drop of effluent from the sulphate works had been turned into the sewers since April last. Thereupon the Council sent several samples of sewage taken from the pipe from the Company's premises in October to Dr. Rideal for analysis; and at the last meeting his report was read. It was to the effect that in one of the samples he found no less than 30 per cent. of gas liquor; and, having been asked to explain the term, he wrote that he meant effluent from the sulphate of ammonia plant.

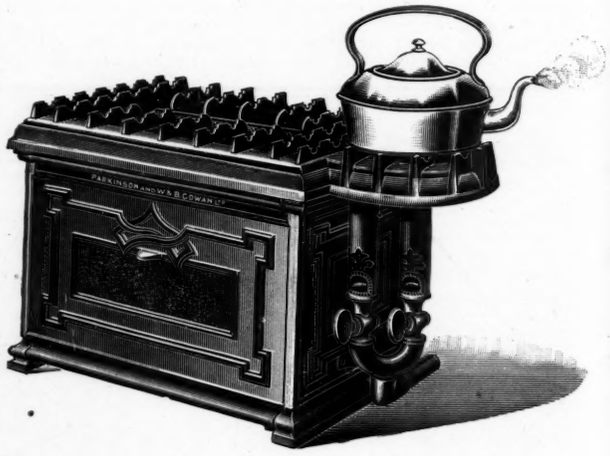
Something New

IN

SMALL GAS STOVES.

A Griller with a separate Boiling Burner.

No. B 230.



Each Burner is controlled by a separate tap; both may be used simultaneously if desired.

UNSURPASSED AS A GRILLER.

MOST ECONOMICAL FOR BOILING.

Write:

PARKINSON AND W. & B. COWAN, LTD.

(PARKINSON BRANCH),

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

Local Authorities and the Sulphur in Gas Bill.—At the meeting of the Wandsworth Borough Council last Wednesday letters were read from the Town Clerks of Shrewsbury and Cambridge, asking for co-operation to oppose the Gas Companies (Removal of Sulphur Restrictions) Bill. It was decided to reply that the Council were not prepared to join in the suggested combined opposition.

Incandescent Gas Lighting at Brighouse.—The Brighouse Highways Committee have for some time been making experiments in street lighting, as a result of which the Town Council, on their recommendation, have agreed that the whole of the street-lamps in the borough (numbering about 780) shall be placed on the incandescent system. Already 100 lamps have been converted; and the saving in gas consumption has been found to be very considerable. Last year the cost of the street gas lighting amounted to about £3000; and it is expected that with the incandescent system about one-third of this will be saved.

Expensive Gas-Pipe Testing.—At Darlington, last week, John Pendlebury was summoned by the Corporation for having improperly tapped a gas-main. It was explained that the defendant had declined to pay the £5 deposit requested before he was allowed to have gas for his business as a plumber. The offence was admitted; but it was urged that the india-rubber pipe put into the service-main had been inserted for the purpose of seeing if there were any leakages—in fact, for purely experimental purposes. The "experiment" cost defendant £1 and costs; a Magistrate remarking that it did not require the main to be tapped to find out if there were any leakages.

Sales of Shares.—The result of the invitation for tenders for 2000 £10 "B" shares (7 per cent.) in the Bournemouth Gas and Water Company, which were invited in our columns a few weeks ago, was the offer of about three times the amount of capital to be issued. The shares were allotted at an average price of £16 6s. 7d. each. Messrs. J. G. Killingworth and Son recently sold some shares in the Boston Gas and Water Companies. Ten £10 new shares in the Gas Company fetched £14 12s. 6d. each; and two £25 shares in the Water Company £54 2s. 6d. each. Mr. C. F. Barrell last week sold by auction 83 £10 shares in the Grantham Water Company. The price realized was £28 2s. 6d. each.

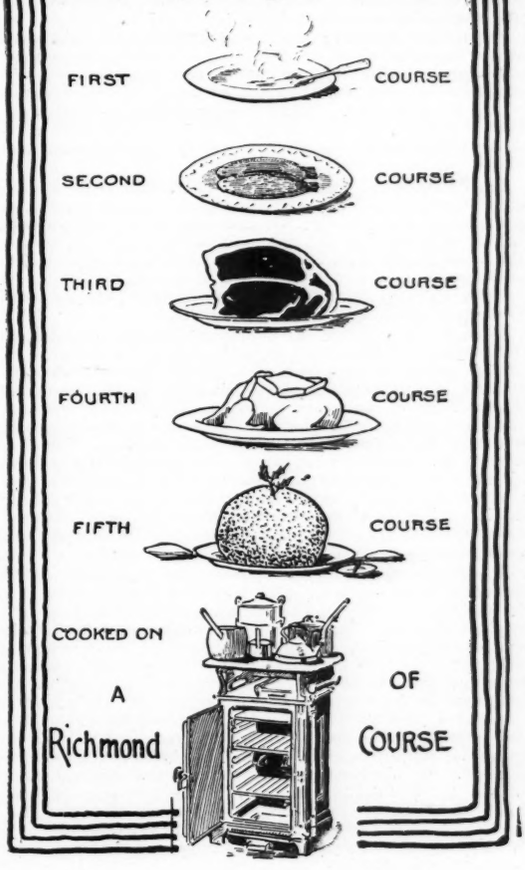
Rio de Janeiro Gas and Electricity Supply.—According to a letter from a correspondent in Rio de Janeiro which recently appeared in the Engineering Supplement to "The Times," a powerful Canadian Syndicate has been formed to take over the supply of light and power for the city. He says that their progress has not been entirely unchecked. It is understood that they have acquired a majority of the shares in three Tramway Companies and in the Gas Company, who also own the concession for the supply of electric light. They have even taken over the management of two of the Tramway Companies and of the Gas Company, and have laid down some miles of underground wires; but the principal Tramway Company have so far successfully resisted amalgamation, and there is a hitch in the municipal concession for lighting the city. The old Rio Gas Company had obtained the most exorbitant rates for public and private supply per kilowatt produced by steam or gas energy, but had failed to stipulate for any fixed rate for the same unit produced by hydraulic power. The Light and Power Company are cheerfully inclined to accept half this rate, but ask for an extension of the term of 15 years fixed by the present concession.

Launceston Town Council and the Gas Company.—Further discussion took place at the meeting of the Launceston Town Council yesterday week, with reference to the supply of water to the gas-works. The Water Committee had recommended that the Company be supplied by meter at 1s. per 1000 gallons. The Company replied that they had no objection to a meter supply, but that, as compared with other consumers in the borough, they thought a charge of 6d. per 1000 gallons would be sufficient. Mr. Shuker thought they might meet the Company half way, and proposed that the charge be 9d. per 1000 gallons. This was agreed to. With reference to the allegation that effluent from the sulphate of ammonia plant found its way into the sewers, the Company wrote that they were satisfied with the present position of the drainage pit, and considered it to be in no way detrimental to the Corporation's sewage works. In deference, however, to the wishes of the Council, they were willing that another pit should be made further from the sewer; but considering the cost already incurred by the Company, they thought any further expense should be borne by the town. The Sewage Committee recommended the Council to bear half the expense. The Mayor said he believed the Company were sincerely anxious to meet the Council in the matter; and he hoped the Council would agree to the suggested basis of settlement. This they did.

An Offer to Buy the Torquay Electricity Works.—An offer has been received by the Torquay Corporation, from the National Electric Construction Company, to lease or buy the municipal electricity undertaking. At a meeting of the Town Council on the 5th inst., Mr. Mortimer, the Chairman of the Electric Lighting Committee, said the matter was receiving the earnest consideration of the Committee. They felt that the Corporation had in the undertaking a very valuable property, and time was required to enable them to make up their minds as to what should be done. At the same meeting, a letter was read from Mr. C. N. Luxmore, resigning his seat on the Council. He has been a severe critic of the policy pursued in reference to the electric tramways. He complained in his letter that while members holding gas shares were precluded from voting on electric lighting questions, other members who were owners and occupiers of property on the proposed tramway routes were allowed to give votes to their own material advantage. He expressed the opinion that the electric light undertaking as conducted by the Council did not pay. He had, he said, questioned its value being £75,000, and now £50,000 was the sum that was being discussed. A retrograde step would be taken if one of the conditions of the sale of the undertaking was to be the tying of the town down for five years to the present costly and inefficient street lighting. One important advantage of selling would be absolute freedom to adopt lighting which would give the ratepayers the most efficient light at the least cost, which was certainly not the present quality of the electric light at 4·85d. per unit.

Xmas

1905.



Best Wishes

from

THE RICHMOND GAS STOVE & Meter Co., Ltd.

WARRINGTON, STRATFORD, AND LONDON.

Gas Poisoning Case at Bangor.—The death has taken place at Bangor of a Mrs. Northedge, who was discovered unconscious in her bed as the result of a gas escape. At the inquest, the Jury returned a verdict of "Death from gas poisoning," and recommended the Corporation to overhaul the gas-mains.

Shrewsbury Water Supply.—At a recent meeting of the Shrewsbury Town Council, it was resolved to proceed with the Castle Pulverbatch water scheme and to promote a Bill for authority to do so. The cost of acquiring the watershed (about 2137 acres in extent), which, it is estimated, will yield a supply for 200 days, is £35,000. The whole scheme is to cost £148,000.

Gas-Mains in Westminster.—The Works Committee of the Westminster City Council reported last Tuesday that the statutory companies had written generally agreeing to the proposed conditions to be in future imposed by the Council in the case of street works. Exception had been taken by some to the rule prescribing the minimum depth from the surface at which pipes should be laid; and it was suggested that words such as "where it is possible" should be added to the clause. This was agreed to.

Wages of Lamplighters at Belfast.—Mr. James Stelfox, the Engineer of the Belfast Gas-Works, has been making inquiries, for his Gas Committee, as to the remuneration of lamplighters for Sunday labour; and in eleven large towns to which he has written, he finds that there is no extra pay for work done on this day. The conditions are different in various kinds; but he has had the gratification of discovering that the wages in Belfast are higher than those in any of the other towns referred to.

Gas v. Electricity for Workhouse Lighting.—The Paddington Guardians, at a recent meeting, referred back a report from the Building Committee recommending that electric light should be installed in the new workhouse extension blocks. Last Tuesday, the Committee brought up another report, stating that, on further consideration, they had formed the opinion that gas would be more economical than electricity; and they therefore recommended that it should be employed. The Board adopted the recommendation.

Prepayment Meters in Manchester.—The prepayment gas-meter is finding increased favour in Manchester. In 1904, during the eight months ending November, Corporation inspectors paid 330,211 visits to prepayment meters; and the average amount collected on each visit was 1s. 9·63d. per meter. During the same period this year, the visits numbered 352,549; and the average receipts per meter were 2s. 1·55d. Ordinary consumers have used more gas; the increase since the end of March last having been 6 per cent.

The Quinquennial Valuations.—At the meeting of the Paddington Borough Council last Tuesday, it was reported that, as a result of the recent quinquennial valuation, the assessment of the Gaslight and Coke Company in the borough had been reduced by £3530. At the meeting of the Lewisham Borough Council on Wednesday, it was reported that the assessment of public companies had been raised by £5650. While there were large reductions in the railway valuations, the increase in the gas and water assessments had been substantial.

Borough Councils and the Supply of Electric Light Fittings.—At the meeting of the London County Council on Tuesday week, Mr. E. White moved the omission from the Council's General Powers Bill of the clause to authorize Borough Councils to supply electric fittings and to wire and fit consumers' premises. The clause in question was noticed in the "JOURNAL" for the 28th ult. He said he considered this a most objectionable form of municipal trading. The Borough Council of St. Marylebone had already incurred liabilities to the extent of £2,000,000 in respect of their electric light undertaking; but this clause to enable them to supply electric fittings was struck out of their Bill. If the municipal authority were to supply electric fittings, why not gas-fittings or furniture? It would mean a serious injury to trade if such powers were given. The motion was defeated.

Electrical "Rushlights" a "Luxury" at Maidstone.—Mr. Lyle, who, besides being a member of the Maidstone Urban District Council, is on the Electric Lighting Committee, has been indulging in some very plain speaking. Regarding a proposal to instal further electric lamps, he said there was so much dissatisfaction with reference to the "rushlights" put up in the streets, that he thought it was simply wasting the ratepayers' money. For the purpose of street lighting, they ought to put up the best lamps they could get; and the present ones, he contended, were not the best. He felt compelled to raise his voice in the interests of the ratepayers, against such outlay. The electric light was too expensive; and it was hardly possible to see from one post to another. Mr. Vaughan, in consequence of these remarks, described Mr. Lyle as "fouling his own nest;" while Alderman Clifford, who did not think there was much difference between electricity and gas, pointed out that the Council, in becoming the possessors of the electric light undertaking, had gone in for a luxury, and therefore they must be prepared to pay for it.

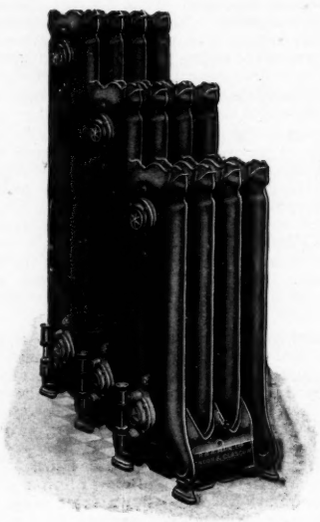
Liverpool and the Gas Supply of Fazakerley.—In calling the attention of the Liverpool City Council to a recommendation of the Electricity Power and Lighting Committee, that application should be made for a Provisional Order to enable the Corporation to supply gas in Fazakerley, Dr. Permewan said that, as he understood the Gas Company would take steps to furnish the supply, he hoped the Committee were not going to embark on any capital expenditure. The Chairman of the Committee (Mr. R. Dart), in reply, pointed out that Fazakerley was outside the area with which the Gas Company were empowered to deal. Dr. Permewan retorted that this might be the case now; but the Company could obtain the necessary statutory authority. Mr. Dart thought the Council should put themselves in a position to fulfil all their obligations with respect to Fazakerley; and he emphasized the fact that nothing could be done without the Council's approval. Alderman Watts agreed with the Committee, and hoped that the recommendation would be proceeded with. He remarked that they had a huge monopoly in their midst; and he saw no reason why it should be extended, because a gas supply could be provided at about half the present price. The recommendation was adopted.

THE "MAIN"

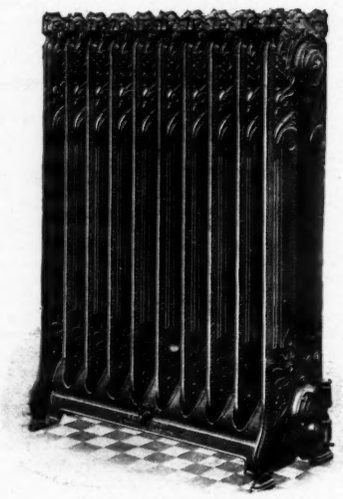
"ST. MUNGO"

Gas-heated

STEAM RADIATORS.



Plain Design.



Ornamental Design.

FITTED WITH EVERY MODERN IMPROVEMENT

Write for Prices.

R. & A. MAIN, LTD.,

LONDON, GLASGOW, & FALKIRK.

Dover Water-Works Profits.—At a meeting of the Dover Finance Committee last week, it was reported that a profit of £3783 had been made on the past year's working of the water undertaking. This sum—which is equal to nearly a 5d. rate—has been allocated to the relief of the general district rate.

Electric Wires Again Suspected.—Last Wednesday morning, the Grand Hotel de la Paix, at Rome, was destroyed by a fire, which is believed to have been caused by the fusing of electric wires. The outbreak started by the lift; and very soon the flames spread to the whole building. Fortunately, though over 200 were sleeping in the hotel, no lives were lost.

The Condition of the Leicester Water Supply.—Notwithstanding the heavy rains which occurred a few weeks since, the water supply of Leicester is still in a very unsatisfactory condition. The consumption of 267,505 persons on the Corporation supply has been reduced by 6½ gallons per head per day, and the aggregate from 5,695,800 gallons to 3,576,630 gallons per day. The consumption for all purposes—manufacturing, sanitary, and domestic—has been reduced from 19·85 gallons to 13·37 gallons per head per day, which is regarded as about the minimum practically obtainable. In spite of this and the cutting off of all supplies for 10 hours a day, the stocks in the reservoirs continue to sink, and the water is only about one-fifth of the normal. The total in store is now only 299 million gallons, against 1379 millions when the reservoirs are full, or a deficiency of no less than 1080 million gallons. This will only yield about 33 days' supply of good water. All the possible supplementary sources have been tapped, and a large number of deep wells sunk have proved to be useless; the water being either too hard or too impure to be pumped into the mains direct.

The Ramsgate Corporation Gas Department have placed orders with Messrs. Clapham Bros., Limited, of Keighley, for one of their patent "Eclipse" reversible condensers and a tar extractor.

At the meeting of the Smethwick Town Council on Tuesday, the Gas Committee reported that the sale of gas for the half year ended Sept. 30 showed an increase of 16,793,900 cubic feet, or 13·2 per cent., over the corresponding period of 1904, with an increase in the gas-rental amounting to £1845.

The ratepayers of Keady, at a meeting held to consider the advisability of erecting new gas-works in the town, decided that the Clerk to the Urban District Council should communicate with Mr. James Whimster, of Armagh, and ask him to visit the town and give a detailed account as to the outlay that would be necessary.

Messrs. J. & W. B. Smith, of Farringdon Road, E.C., are issuing to the trade a neat pamphlet showing some of their latest "lines" in lighting goods. It embodies a varied selection of lamps and fittings arranged in a booklet of convenient size; and it may be commended to the notice of all who are engaged in the lighting industry.

It is stated that, after being extensively tried by the North-Eastern Railway Company, self-discharging waggons are about to be utilized at the Birmingham Gas-Works. They will be constructed of steel. Although the cost will be 25 per cent. more than that of those they will replace, it is hoped that this additional outlay will be more than counterbalanced by the saving of labour.

Messrs. Clayton, Son, and Co., Limited, have sent us a very effective business Christmas card which they have had prepared. It is a coloured picture, having in the background the 12¼ million cubic feet gasholder at East Greenwich—the largest in the world—which they erected in twelve months for the South Metropolitan Gas Company, and in the foreground a portion of the road leading up to it.

In July last, the Westminster City Council consented to an application by the New York Air Brake Company to erect, by way of trial, one of their incandescent oil-lamps in Whitehall, opposite the Horse Guards. The Works Committee of the Council reported last Tuesday that the lamp in question did not appear to be working satisfactorily, and they had therefore called upon the Company to remove it. A Scott-Snell lamp, similar to the others in Whitehall, is to be put up in its place.

We have received from John Heywood, Limited, of Manchester and London, Calvert's "Mechanics' Almanack and Workshop Companion" for 1906. It contains, in addition to a calendar and the usual matter, practical, technical, and industrial information for artisans and handicraftsmen, and those engaged in mechanical, electrical, engineering, building, and constructive trades, arranged under the editorship of Mr. W. Calvert, M.E. This is the twenty-third year of publication; and it may be justly called a useful year-book for the classes named.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ASSISTANT-ENGINEER. Stockport Gas Department. Tenders by Jan. 3.
ASSISTANT GAS ENGINEER AND MANAGER. No. 4523.

Stocks and Shares.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY. Jan. 16.
BISHOPS STORTFORD GAS COMPANY. Jan. 16.
LEA BRIDGE GAS COMPANY. Jan. 16.
SOUTH METROPOLITAN GAS COMPANY.
YORK UNITED GASLIGHT COMPANY. Jan. 15.

TENDERS FOR

Coal.

COPENHAGEN LIGHTING DEPARTMENT. Tenders by Jan. 15.

Charging Apparatus and Conveying Machinery, &c.

NELSON GAS DEPARTMENT. Tenders by Jan. 17.

Fire-Clay Goods.

ACCRINGTON GAS AND WATER BOARD. Tenders by Jan. 10.
SALFORD GAS DEPARTMENT. Tenders by Jan. 4.

Retort Setting (Inclined), &c.

NELSON GAS DEPARTMENT. Tenders by Jan. 17.

Tar and Liquor.

HARROGATE GAS COMPANY. Tenders by Jan. 5.
GAINSBOROUGH GAS DEPARTMENT. Tenders by Jan. 2.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 889.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	20½—21½	..	4 17 8
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	Nov. 15	7	Bombay, Ltd.	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5½	..	5 1 10
59,000	10	Aug. 31	14	Bourne-mouth Gas and Water	10 p.c. 29—30	..	4 13 4
51,810	10	,,	7		B 7 p.c. 17—18	..	3 17 9
53,200	10	,,	6		Pref. 6 p.c. 15½—16½	..	3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated	260—265	+2	4 14 4
300,000	,,	,,	9½	Do. New	197—202	..	4 14 1
50,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb.	101—104*	..	3 16 11
220,000	Stk.	Sept 15	11¼	Brighton & Hove Orig.	220—225	..	5 0 0
246,320	,,	,,	8½	Do. A. Ord. Stk.	160—165	..	5 0 0
460,000	20	Sept. 28	10	British	42½—43½	..	4 11 11
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c.	120—123	..	4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c.	90—93	..	4 16 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12½—12⅝	..	5 9 10
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
150,000	20	July 13	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Oct. 27	4½	Do. 4½ p.c Pref.	10—10½	..	4 5 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	102—104	..	4 6 7
1,434,680	Stk.	Aug. 31	5⅛	Commercial 4 p.c Stk.	116—118	..	4 8 1
560,000	,,	,,	5	Do. 3½ p.c. do.	112—114	..	4 7 9
450,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	84—86*	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	126—129*	+1	5 0 9
200,000	,,	,,	7	Do. 7 p.c Pref.	143—148*	..	4 14 7
424,070	Stk.	—	5½	Derby Con. Stk.	125—127	..	4 6 8
55,000	,,	June 3	4	Do. Deb. Stk.	108—110	..	3 12 9
486,090	10	July 28	11	European, Ltd.	22—23	..	4 15 8
354,060	10	,,	11	Do. £7 10s. paid	15—16	..	5 3 2
15,223,235	Stk.	Aug. 16	4⅛	Gas-light and Coke	4 p.c. Ord. 102—103	−½	4 5 5
2,600,000	,,	,,	3½		3½ p.c. max. 89—91	..	3 16 11
3,799,735	,,	,,	4		4 p.c. Con. Pref. 110—112	−½	3 11 5
4,193,975	,,	Dec. 14	3		3 p.c. Con. Deb. 86—88*	..	3 8 2
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	98—101	..	4 19 0
70,000	10	Oct. 13	11	Hongkong & China, Ltd.	19½—20½	..	5 7 4
3,800,000	Stk.	Nov. 15	10	Imperial Continental	233—235	+½	4 5 1
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	123—128	..	4 13 9
561,000	Stk.	Aug. 16	10	Liverpool United A	234—236	..	4 4 9
718,100	,,	,,	7	Do. do. B	172—174	..	4 0 6

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	June 29	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	Dec. 14	5	Malta & Medn., Ltd.	4¼—4⅜*	..	5 5 3
560,000	100	Oct. 2	5	Met. of	5 p.c. Deb. 100—102	..	4 18 0
250,000	100	,,	4½	Melbourne	4½ p.c. Deb. 100—102	..	4 8 3
541,920	20	Nov. 15	3½	Monte Video, Ltd.		..	5 12 0
1,565,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	107—109	..	4 4 10
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	100—102	..	3 8 8
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	18½—19½	..	5 2 7
52,940	1	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	148—151	+1	5 6 0
600,000	5	Sept. 14	7	Ottoman, Ltd.	6—6½	..	5 7 8
168,255	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	6	Primitiva Ord.	7—7½	..	4 0 0
796,980	5	July 28	5	Do. 5 p.c. Pref.	5⅛—5⅜	..	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	97—99*	..	4 0 10
851,070	10	Oct. 13	7	River Plate Ord.	12¼—13¼	..	5 5 8
300,000	Stk.	June 29	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
250,000	10	Sept. 28	7	San Paulo, Ltd.	13—13½	..	5 3 8
70,000	50	July 1	5	Do. 5 p.c. Deb.	51—53	..	4 14 4
135,000	Stk.	Sept. 14	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,498	,,	,,	10	Do. C	244—246	..	4 1 4
126,106	Stk.	Aug. 31	5½	Shrewsbury Ord. 5 p.c.	110—120	..	4 11 8
70,000	10	Sept. 28	10	South African	15½—16½	..	6 1 3
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.	132—134	..	4 2 1
1,895,445	,,	July 13	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.	123—126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
112,533	,,	July 13	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	Nov. 15	5	Southampton Ord.	109—112	..	4 9 3
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¼	Tottenham and Edmonton	A 5 p.c. 125—128	..	4 17 8
363,020	,,	,,	4½		B 3½ p.c. 99—102	..	4 13 2
125,000	,,	Dec. 14	4		4 p.c. Deb. 105—107*	..	3 14 9
182,380	10	June 15	8	Tuscan, Ltd.	9¾—10¼	..	7 16 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
30,000	Stk.	Aug. 16	7⅞	Wands-worth and Putney	A 5 p.c.	..	—
255,636	,,	,,	6¼		B 3½ p.c. 137—140	..	4 9 3
60,000	,,	,,	5 17/20		C 3½ p.c. 113—116	..	4 13 6
57,564	,,	June 29	3		3 p.c. Deb. Stk. 82—85	..	3 10 7
745,872	,,	Aug. 16	5	West Ham 5 p.c. Ord.	106—108	..	4 12 7
185,000	,,	,,	5	Do. 5 p.c. Pref.	123—126	..	3 19 4
193,300	,,	June 29	4	Do. 4 p.c. Deb. Stk.	104—109	..	3 13 5

Prices marked * are "Ex. div."

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

BROTHERTON & CO., LIMITED.
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Correspondence invited.

GLASS SHADES of every description,
for all kinds of Interior GAS LIGHTING.
Illustrated sheets on application.
JOHN WALSH WALSH,
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TAR AND LIQUOR WANTED.
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works SELBY.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SPENT OXIDE.
THE South Metropolitan Gas Company
are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
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REPAIRS RECEIVE PROMPT ATTENTION.
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HOLLAND.
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CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO WATER AND GAS COMPANIES REQUIRING CAPITAL.
THE Water and Gas Debenture Share
Investment Trust, Limited, of 37, High Street, Tunbridge Wells, are prepared to Invest £10,000 Capital in above, and also to Underwrite Progressive Water and Gas Companies' issues.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, which has been used for many years on the Continent for the cleaning of Mains and Services, and is now being adopted in England. It is also used for the Enrichment of Gas, and has an Illuminating Value of double that of 90 per cent. Benzol.
Supplied by C. BOURNE, 120, Manor House Road, NEWCASTLE-ON-TYNE.

ASSISTANT ENGINEER AND MANAGER.
A GAS Company making 500 Million cubic feet of Gas per annum invite APPLICATIONS for the position above referred to.
Applications, stating Age, Qualifications, Experience, Salary required, and enclosing *copies* only of Three recent Testimonials (or References) to be sent to No. 4523, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COUNTY BOROUGH OF STOCKPORT.
THE Gas Committee invite Applications for the position of ASSISTANT GAS ENGINEER, at a commencing Salary of £120 per Annum, rising, at the discretion of the Committee, to £200 per Annum.
Applications, stating Age, Qualifications, and Experience, with *copies* of not more than Three recent Testimonials, to be addressed to "The Chairman of the Gas Committee," and delivered at this Office on or before Wednesday, the 3rd of January, 1906.
Canvassing will be deemed a disqualification.
ROBERT HYDE,
Town Clerk.
Town Clerk's Office,
Stockport, Dec. 14, 1905.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

M. LEVY ON INCANDESCENT GAS LIGHTING.
THE attention of Engineers, Contractors, Manufacturers, and others interested in the use of Gas for Lighting, Heating, and Motive Power, is called to the work on "INCANDESCENT GAS LIGHTING," by M. PAUL LEVY, C.E., of Paris, which was noticed in the "JOURNAL" on the 21st of November. It is a large volume of 284 pages, with 127 figures and 8 large plates.
Copies may be obtained at the Office of the "JOURNAL," at the Price of 8s. 6d. each, post free.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
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SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.),
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

WANTED to Purchase, Gas Carbon delivered at nearest Station to Gas-Works, in quantities of not less than Four Tons.
State Price to No. 4512, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO TAR DISTILLERS.
THE Directors of the Harrogate Gas Company invite TENDERS, to be sent in by Jan. 5, 1906, for their Surplus TAR, for One Year, from Jan. 1, 1906.
Particulars to be obtained upon application to
H. WILKINSON,
Secretary and General Manager.
Gas Offices,
James Street, Harrogate.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)
THE Gas Committee invite Tenders for the supply of RETORTS, FIRE-BRICKS, &c., required at their various Works.
Full Particulars may be obtained on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Fire-Clay Goods," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 4th of January, 1906.
L. C. EVANS,
Town Clerk.
Town Hall, Salford,
Dec. 20, 1905.

GAINSBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
TENDERS FOR AMMONIACAL LIQUOR.
THE Gas Committee of the above Council are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Gas-Works for a period of Twelve Months from the 1st of January, 1906.
Further Particulars may be obtained on application to the undersigned.
Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works, Gainsborough, not later than Tuesday, Jan. 2, 1906.
The Committee do not bind themselves to accept the highest or any Tender.
JOHN BALDWIN,
Manager.
Gas-Works, Gainsborough,
Dec. 20, 1905.

BOROUGH OF NELSON.
(GAS DEPARTMENT.)
INCLINED-RETORT STACK.
THE Gas Committee invite Tenders for the CONSTRUCTION of an INCLINED-RETORT STACK (36 Mouthpieces), with all Hydraulic Mains, Stage Floors, Coal-Conveyors, Charging Apparatus, &c., in the existing Retort-House at their Brierfield Works.
Drawings, Specification, and Quantities may be seen upon application to Mr. A. J. Hope, Engineer, Gas-Offices, Nelson.
Tenders, sealed and endorsed "Inclined-Retort Stack," to be sent to the undersigned before Wednesday, Jan. 17, 1906.
J. H. BALDWICK,
Town Clerk.
Town Hall, Nelson,
Dec. 21, 1905.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

RETORTS AND FIRE-BRICKS.

THIS Board are prepared to receive TENDERS for the supply and delivery of RETORTS and FIRE-BRICKS required during the Year 1096.

The probable requirements are 92 Retorts and 15,000 Bricks for Accrington, and 32 Retorts for Great Harwood.

Tenders, addressed to the Chairman of the Board and endorsed "Tender for Fire-Clay Goods," to be in my hands on or before Wednesday, the 10th of January.

CHARLES HARRISON,
General Manager.

General Offices,
St. James' Street,
Accrington, Dec. 15, 1905.

TENDERS FOR GAS COAL.

THE Lighting Department of Copenhagen is prepared to receive TENDERS for the supply and delivery of 175,000 Tons of GAS COAL from the beginning of March until the end of December, 1906.

The Lighting Department reserves the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to Direktoeren for Kóbenhavns Belysningsvæsen, Vester Boulevard, 22, Copenhagen, B

The Tenders, sealed and marked "Tilbud paa Kul," to be sent to Direktoeren for Kóbenhavns, Belysningsvæsen, Vester Boulevard, 22, Copenhagen, B., before the 15th of January, 1906, Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering who are in attendance.

THE LIGHTING DEPARTMENT OF COPENHAGEN.
Dec. 14, 1905.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the Directors of this Company will OFFER the sum of £100,000 ORDINARY STOCK "to all the Gas Consumers and persons in the employ of the Company," pursuant to the provisions of the South Metropolitan Gas Act, 1901.

Full Particulars thereof, together with the Price of such Stock, will be sent to the consumers with the Gas Accounts for the Christmas quarter.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road, S.E.,
Dec. 14, 1905.

THE YORK UNITED GASLIGHT COMPANY.

SALE BY TENDER OF PREFERENCE STOCK
Under the Provisions of The York United Gaslight Company's Act, 1898.
MINIMUM PRICE, £100 PER CENT.

NOTICE is Hereby Given, that, in pursuance of a Resolution passed at a Meeting of the Company specially convened for the purpose, and held on the 3rd day of August, 1905, it is the intention of the Directors to SELL BY TENDER £10,000 PREFERENCE STOCK, entitled to a Maximum Preferential Dividend of £4 per cent. per annum, to be paid up in full on or before the 15th day of February, 1906; being a portion of the Additional Capital authorized to be raised under the above-named Act.

Particulars and Conditions of Tender may be obtained on application at the Gas Company's Office, Davygate, York, or at the York City and County Bank, or any of its Branches; and sealed Tenders, marked "Tender for York Gas Stock," must be lodged with the Gas Company, Davygate, York, or with the York City and County Banking Company, Limited, York, or any of its Branches, not later than Ten o'clock a.m. on Monday, the 15th day of January, 1906.

By order,
MATTHEW LEAF,
Secretary.

Gas Offices, Davygate,
Dec. 15, 1905.

Now Ready, Price 15s., Limp Cloth.

TWENTY-FIFTH YEAR.

AN

ANALYSIS OF THE ACCOUNTS

OF THE

METROPOLITAN WATER COMPANIES

(Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex),

AND OF THE

ACCOUNTS OF SOME OF THE PRINCIPAL
PROVINCIAL WATER UNDERTAKINGS
FOR THE YEAR 1904-1905.

Compiled by

WOOD, DREW, & CO.,
Chartered Accountants.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

NEW ISSUE OF 2500 £10 ORDINARY SHARES

Ranking for a Standard Dividend of 7 per cent., subject to the Sliding-Scale, the Dividends on similar Shares in the Company having, since 1884, been regularly paid at the rate of 7½ per cent. per annum.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 16, at Two o'clock precisely, in Lots.

Particulars may be obtained at the HEAD OFFICES OF THE COMPANY, in D'Olier Street, DUBLIN, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY
(Supplying Walthamstow and part of Leyton).

NEW ISSUE OF £8000 CONSOLIDATED ORDINARY STOCK,
AND
£2976 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 16, 1906, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BISHOPS STORTFORD AND DISTRICT GAS COMPANY.

NEW ISSUE OF £4000 FIVE PER CENT. PREFERENCE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Jan. 16, 1906, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m. on Tuesday, the 2nd day of January next, and will be RE-OPENED immediately after the Half-Yearly Ordinary General Meeting of the Company to be held on the 2nd day of February next.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., Dec. 20, 1905.

Demy 4to. Limp Cloth. Price 7s. 6d. (Post Free).

THE FLOW OF GASES and PROPORTIONING GAS MAINS.

By
F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

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Telephone 1806.

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Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

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CHESTERFIELD.

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BRETTELL'S ESTATE LIMITED,

FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

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effects a great saving of time, labour, and expense.

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MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

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RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 22, Park Village East, N.W.

GAS LAMPS,
REFLECTING LANTERNS, &c.

S. SHERMAN & SON,
WEST CENTRAL GAS LANTERN WORKS

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57, NEW COMPTON ST., W.C.
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"ROTARY"
STATION METER.

Efficiency Demonstrated.

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T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.

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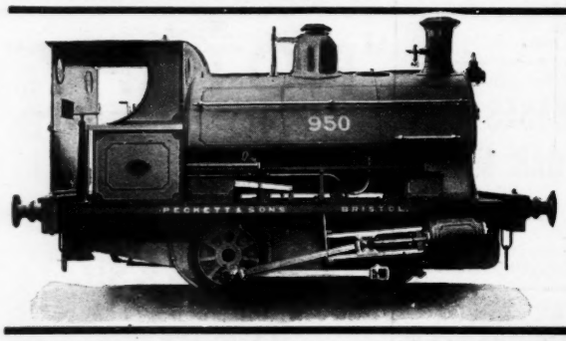

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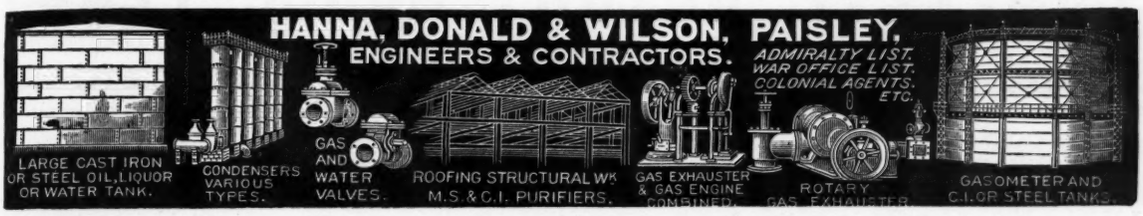
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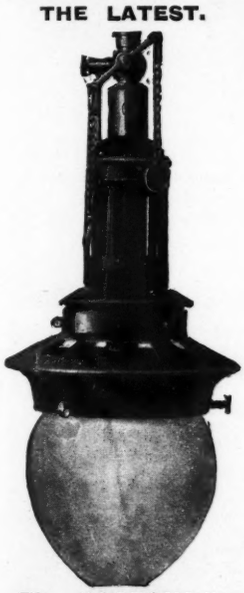

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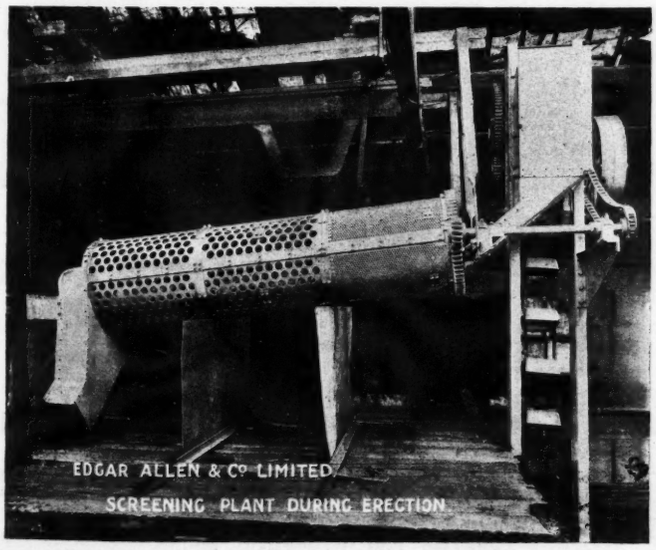

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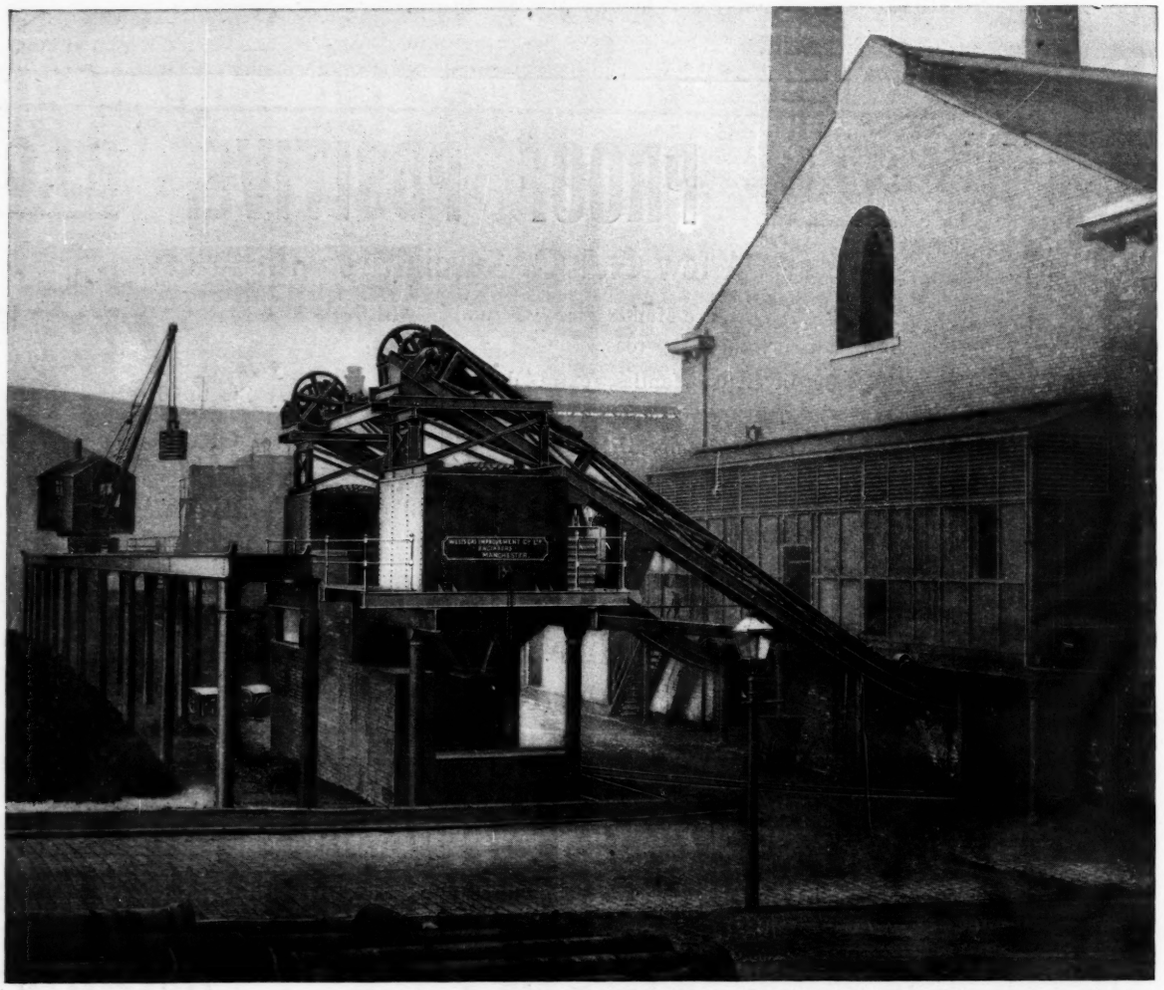

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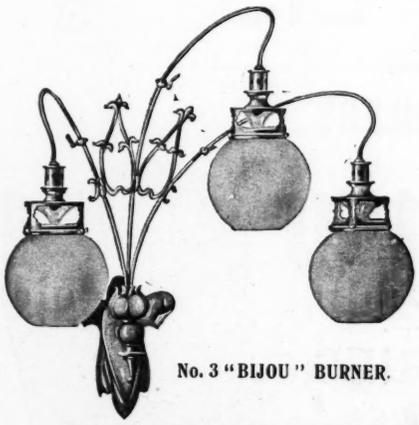

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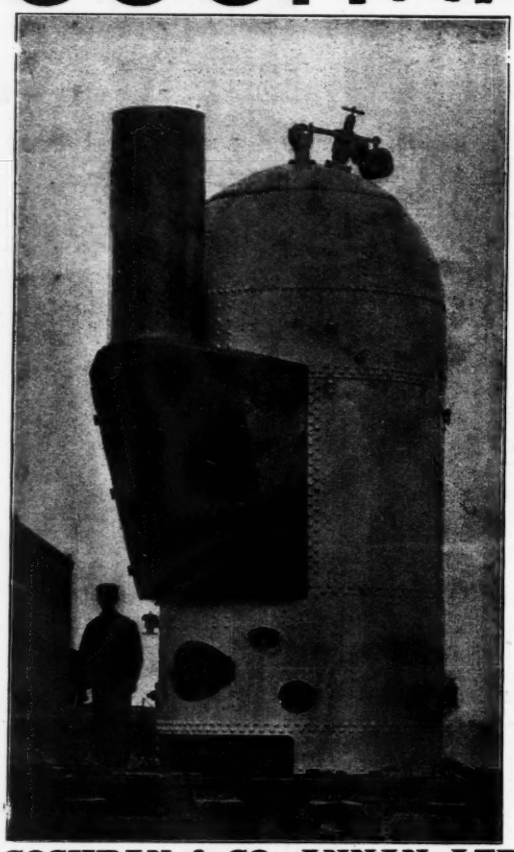

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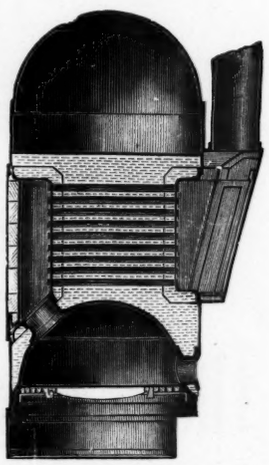

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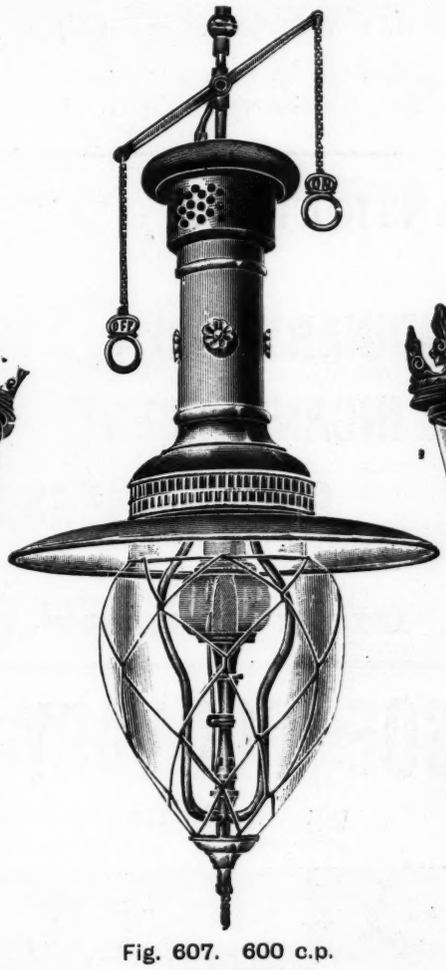
Fig. 35. 100 c.p.



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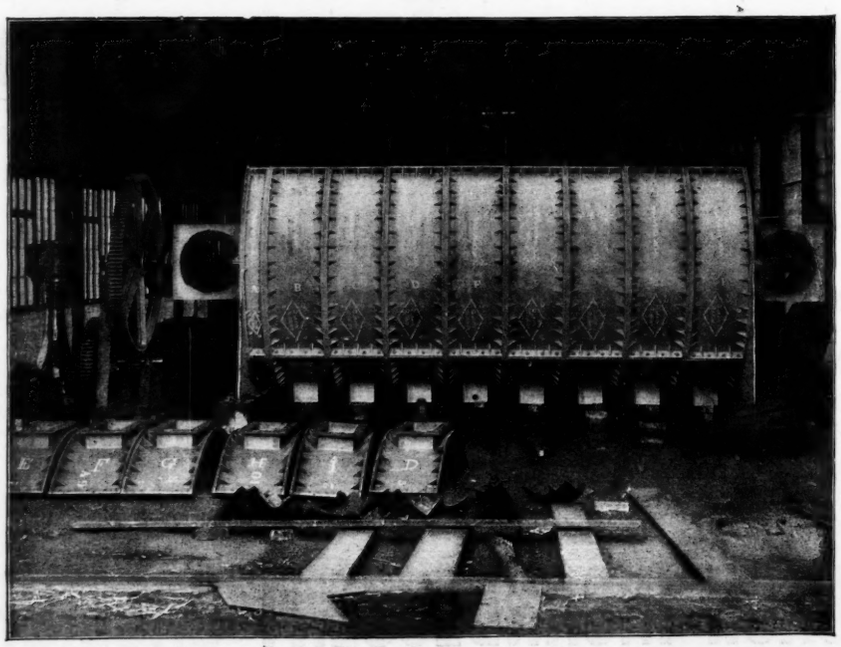

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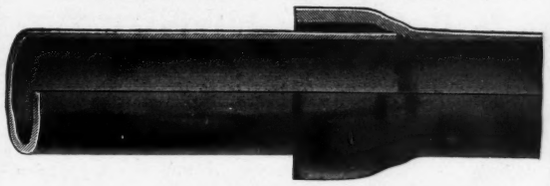

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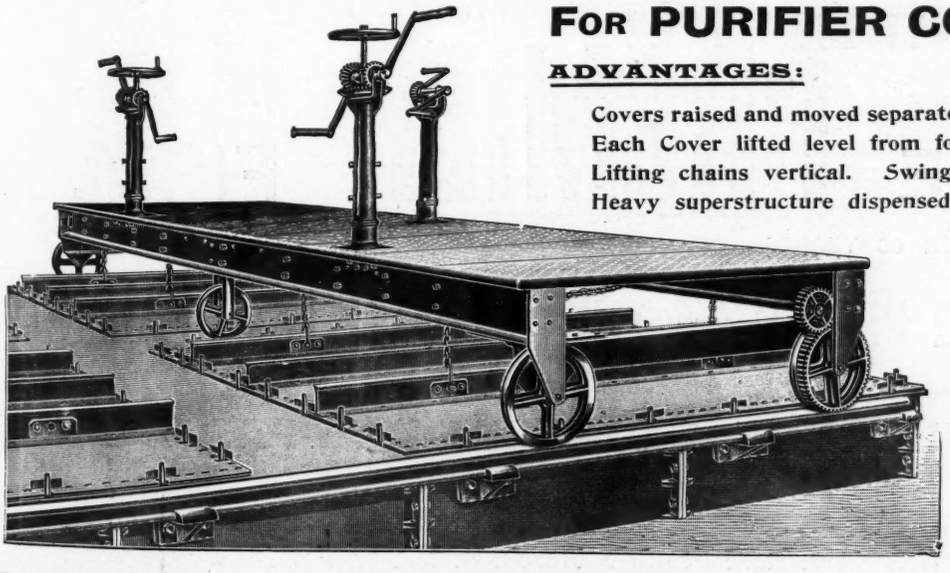

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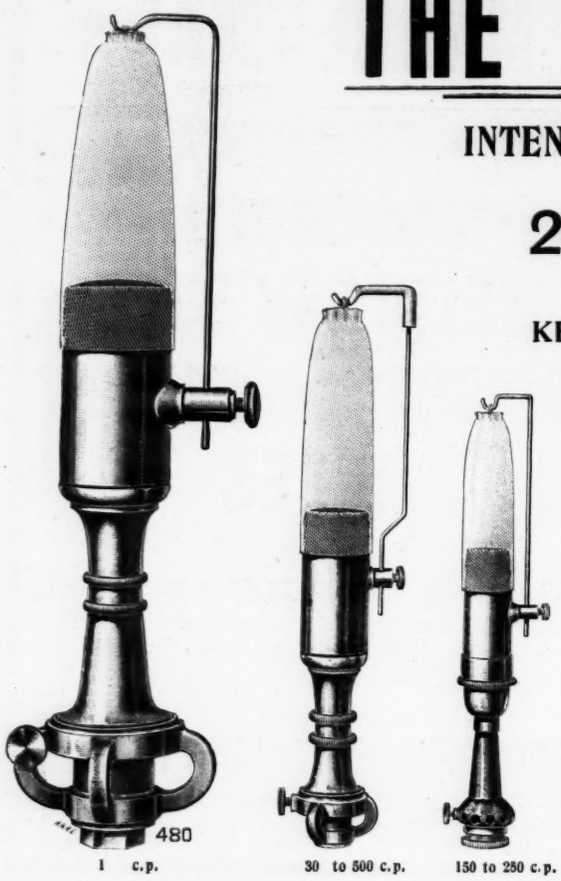

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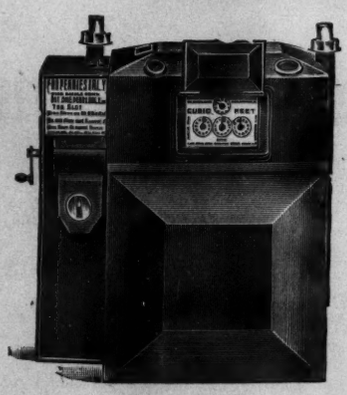

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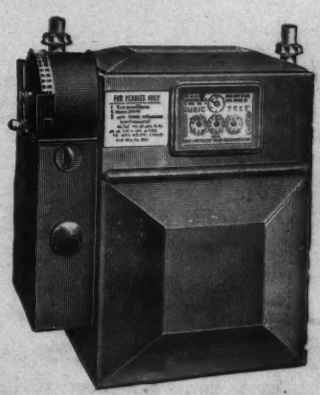

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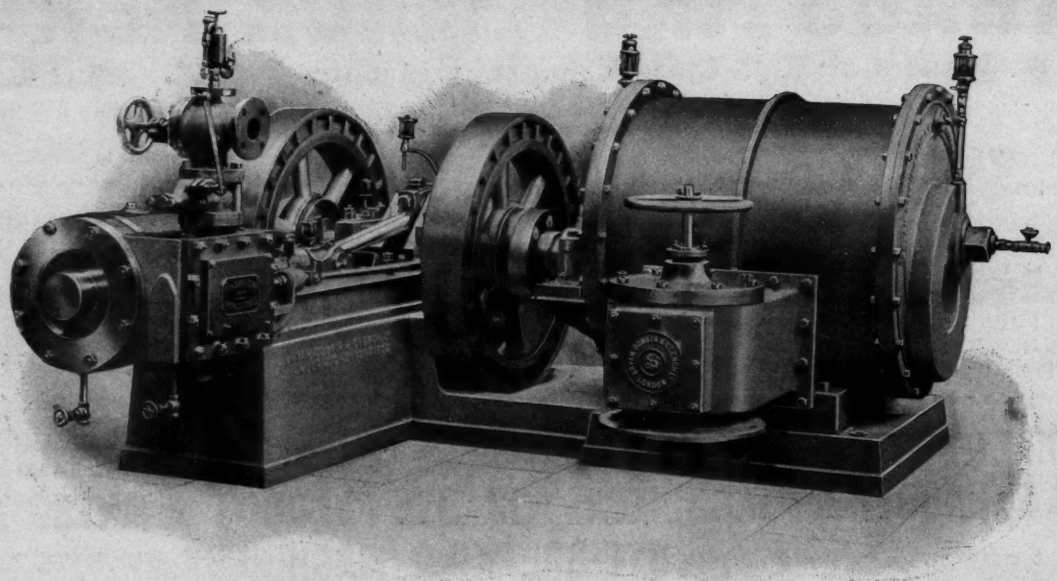

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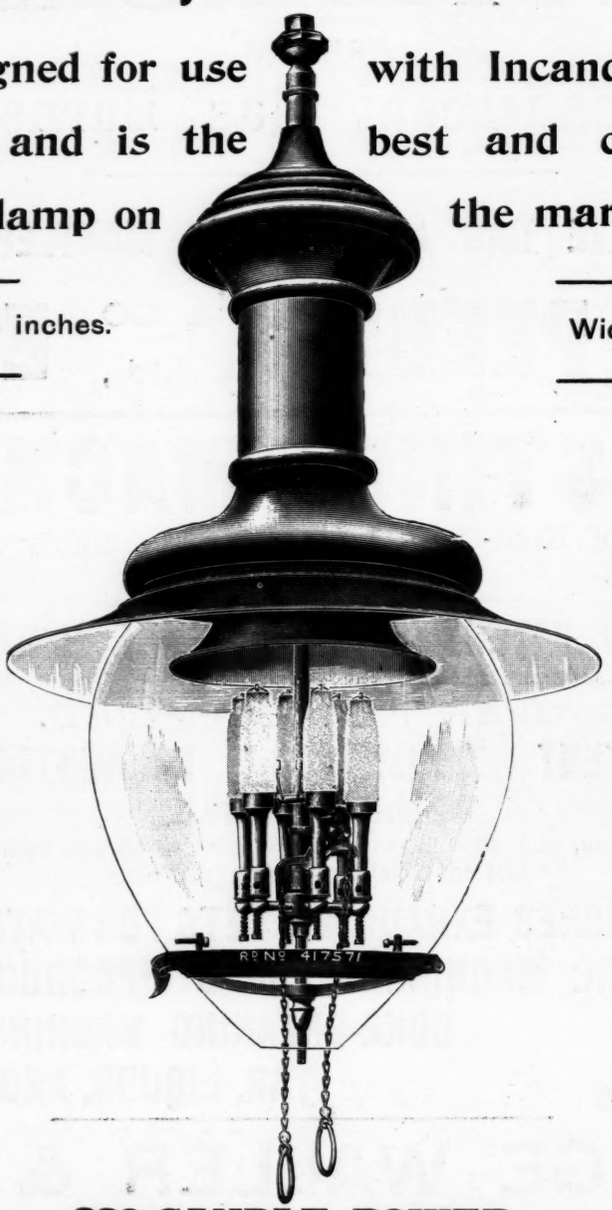

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CHANGING PRICE.
MOST SIMPLE.
NO WHEELS OR PARTS REQUIRED.

THIS METER CAN BE ALTERED *in situ.*

INSTRUCTIONS.

The Brass Plate has holes around its edge, numbered; these indicate the feet delivered for the Coin used.
To set the Meter, note Figs. I., II., III., IV.

Fig. I.
Break Company's Seal and Remove Screw—THUS.

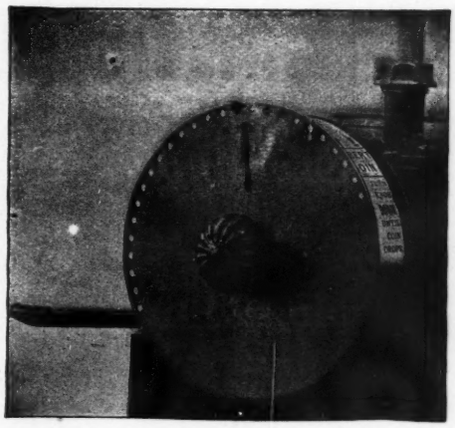

Fig. II.
Swing Band Back—THUS.

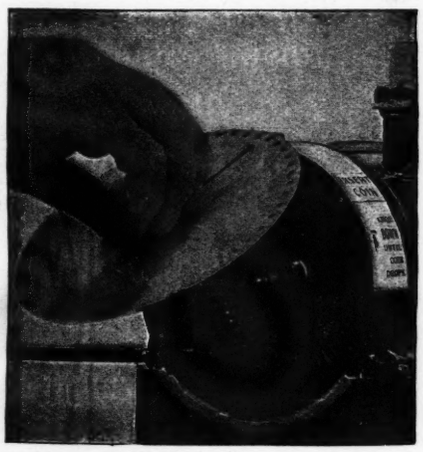

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

Swing Band Forward—Replace Screw—and Re-seal.

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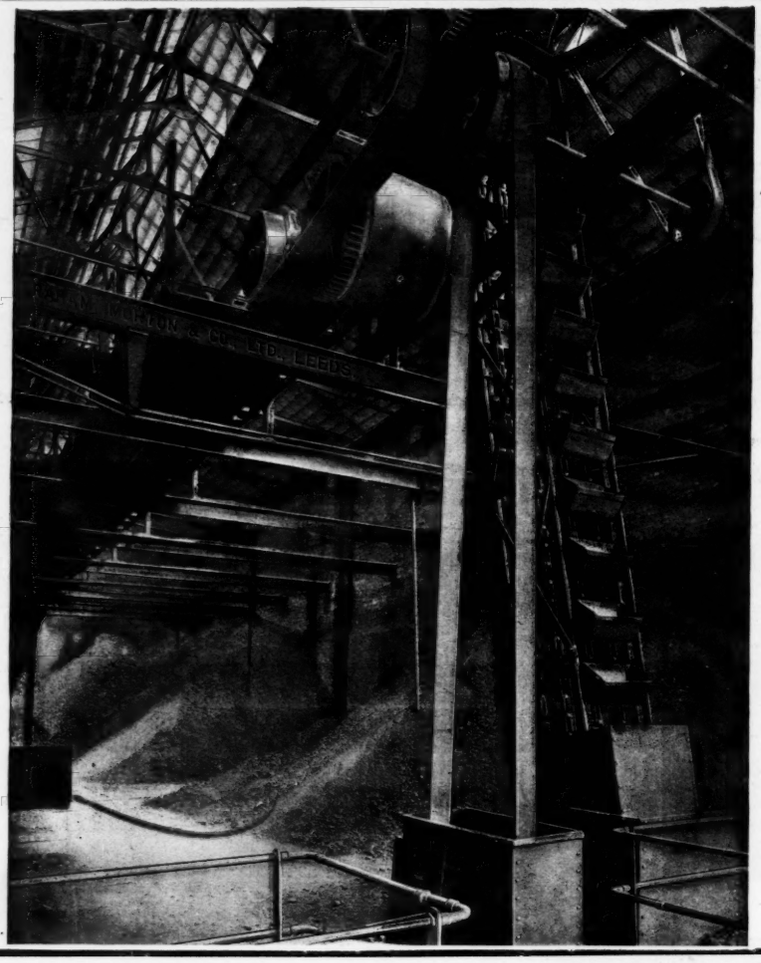

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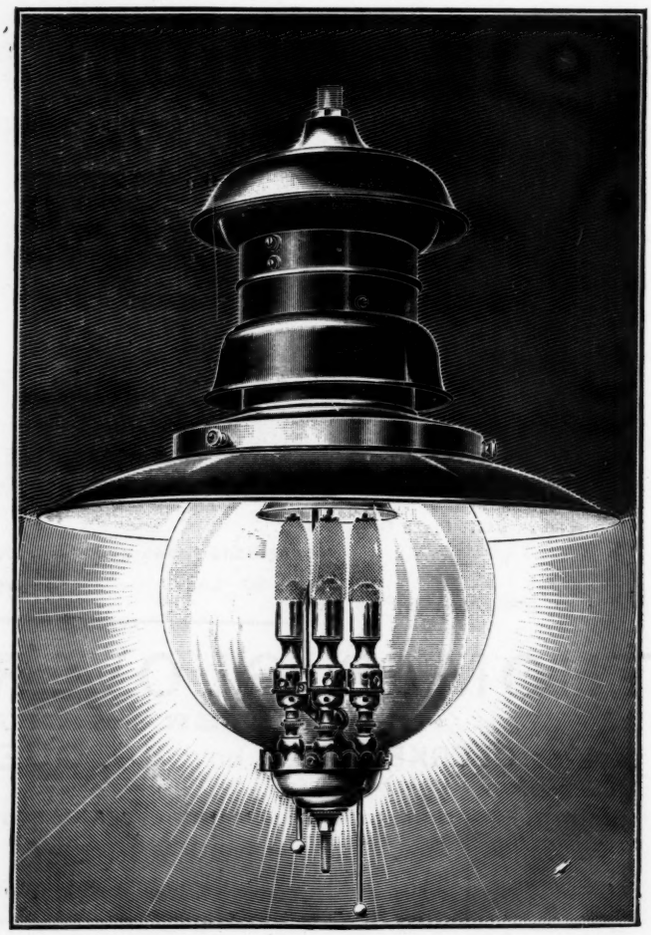

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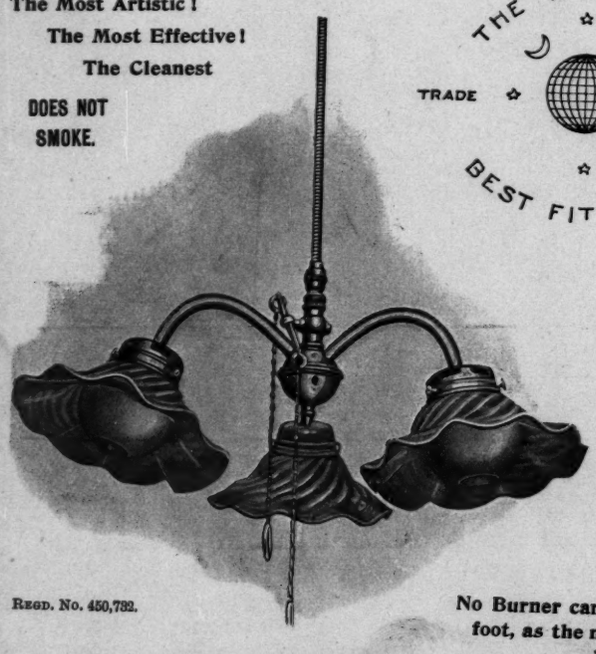

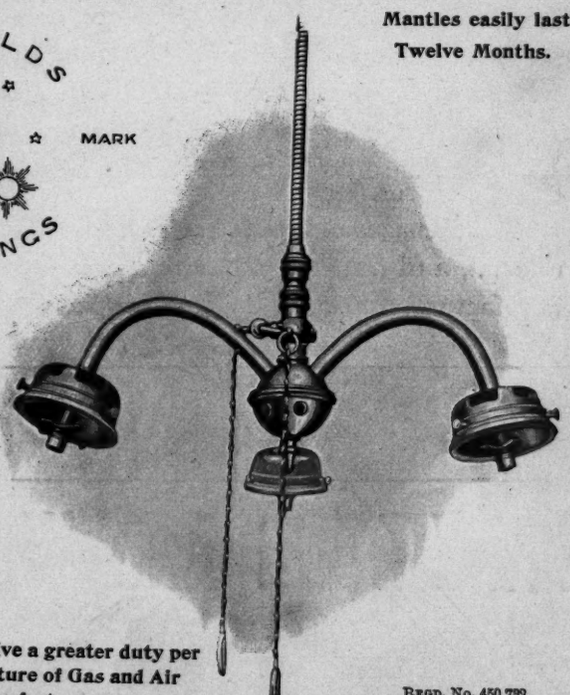

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